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FRIDAY, AUGUST 6, 1897.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

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MSS. intended for publication and books, etc., intended for review should be sent to the responsible editor, Prof. J. McKeen Cattell, Garrison-on-Hudson, N. Y.

THE meetings of the American Association for the Advancement of Science at Detroit next week and of the British Association at Toronto on the following week are events of more than ordinary moment. The visit of the British Association to Montreal in 1884 gave a considerable impulse to science in America. The meeting of our own Association in that year was attended by three hundred British men of science, the total attendance, 1249, being the largest in its history. In the thirteen years that have since elapsed science in America has made a great forward movement. The scientific research accomplished at our universities now surpasses that of the British universities; the work done under our government is greater than in any other country; our scientific journals have doubled in number and increased in influence. If our Association has scarcely kept abreast of the great progress of science, this is the proper time to give it a due place in the scientific economy.

It is certainly the duty as well as the privilege of every American man of science to try to attend the meetings at Detroit and

Toronto. The places and times have been arranged so that this can be done conveniently. The scientific programs and social arrangements for both meetings promise ample reward for those who are able to be present. We must not fail to give British men of science a cordial welcome, and we have much to learn from their meeting. Our own Association deserves support. Every motive of public spirit and self-interest should lead us to make the meeting at Detroit worthy of the present position of science in America and a stepping-stone in its progress.

We do not at all sympathize with the idea sometimes expressed that National Associations for the Advancement of Science have outlived their usefulness. There is nothing more typical of modern social conditions than combinations and trade-unions. Human development depends less than formerly on natural selection of the individual and more on competition between groups. It will fare ill with men of science if they cannot unite to maintain and forward their common interests. With them not only selfish instincts of self-preservation are concerned, but also moral sentiments, for they believe that the interests of science are in large measure conterminous with the interests of civilization.

The objects of the American Association for the Advancement of Science "by periodical and migratory meetings, to promote intercourse between those who are cultivating science in different parts of America, to give a stronger and more general impulse and more systematic direction to scientific research, and to procure for the

labors of scientific men increased facilities and a wider usefulness," are as valid and as important now as they were when the constitution was adopted fifty years ago. Indeed, as the magnitude of the interests increases, the need of caring for them becomes more urgent. With the growth of specialization and the scattering of men of science over the whole area of America, the need of cultivating intercourse between them becomes more pressing. The greater popular interest in science requires direction into proper channels. As science grows, it needs more workers and more money. The workers must be secured from students at school and college, the money from private gifts and from the State. The magnitude of scientific work is now such that in many cases it can only be accomplished by united effort continuing for years. Witness what the Royal Society has accomplished in inaugurating international cooperation in the cataloguing of scientific literature; the Zoologische Gesellschaft in the publication of 'Das Tierreich,' the British Association in the work of its committees. The American Association should not only maintain its present position, but should make itself a still more important factor in the advancement of science.

It must not be forgotten that as the environment alters, the organization that will survive must accommodate itself to the new conditions. Science in America is very different to-day from what it was fifty years ago. There is reason to doubt whether the Association has in like measure enlarged its range and increased the nicety of its adjustments. Methods suitable to a small gath-

ering from a limited area, representing sciences undeveloped and undifferentiated, may have been outgrown.

It seems evident that the permanent organization of the Association, both at and between the meetings, should be strengthened. Even a congress or legislature whose professed object it is to legislate must leave the real work to committees. The democratic character of a scientific association is sufficiently guarded by the election of representatives who will carefully consider and decide questions of policy. It is, indeed, possible that the present Council of the Association is too cumbersome. Then there is need of a strong interim organization, and we think that this should be extended to the sections. A permanent secretary and a committee or council for each section would give greater continuity and efficiency.

It is not possible to divide the field of science into nine sections, each homogeneous and independent of the others. Section A is for mathematics and astronomy, but there are portions of astronomy less closely related to mathematics than are portions of physics, of chemistry and of engineering. The International Congress of Mathematicians meeting this summer will be divided into six sections. On the other hand, there are subjects that would naturally fall in or between two or more sections, and others that would include several sections. Modern science is marked by great specialization, and this itself gives rise to nearly all possible combinations of the sciences and leads us back to the ultimate unity of science.

The solution for the Association seems to be that there should be, on the one hand, sub-sections—consisting perhaps of societies with separate organizations—for the reading and discussion of papers, important only for a limited group of students; and, on the other hand, joint meetings of two or more sections or of the whole Association for the consideration of subjects of general scientific interest, and to promote the organization and advancement of science as a whole.

For example, during the past year two of the most important contributions made to the theory of evolution for a long time have come from America. These are that individual variations set the line of organic evolution and that variations and heredity, respectively, have been confused by attributing the former to the environment and the latter to the organism. These advances have been proposed by a psychologist, a zoologist, a botanist and a geologist. They are not yet acknowledged nor understood by men of science abroad, and would have been a suitable subject for a session of the whole or a large part of the Association.

Taking next an example of desirable specialization, it may be noted that there meet during the Christmas holidays four societies for which there are no places in the Association; these are the American Physiological Society, The Association of American Anatomists, The Society of Morphologists and The American Psychological Association. Each of these societies is composed exclusively of those devoted to research in the sciences represented. At the last meetings an aggregate of over 100 papers was presented, representing one-half

as many papers as are annually read before the Association. It is evident that the Association cannot represent the whole of American science while such important developments are ignored. Only a small percentage of the members of these societies are fellows of the Association.

Indeed, we must admit that a large proportion of those most actively engaged in advancing science in America do not attend the annual meetings, and many are not even fellows of the Association. We may appeal to the public spirit of these men of science and probably with success. It would, however, be far better to make the meetings so fruitful that each would like to attend, and, if possible, to give those unable to attend some return for membership in addition to the annual volume of proceedings. Election as fellow should be an honor that no one would decline. The fellows should not be elected exclusively from the members, but those who are doing the most for the advancement of science in America should be the fellows of the Association. It would probably be desirable to limit the number of fellows to one thousand and to fill vacancies each year as they occur. As soon as the fellows of the Association were acknowledged to be the thousand leading men of science in America, election would be an honor only less in degree than election to membership in the National Academy of Sciences. In this case an added interest would be given to the annual meetings. With the National Academy as the 'upper house' and the American Association the 'lower house' of American science a great improvement

in organization would be effected. It would be a natural courtesy for the Academy to elect its members from the Association and for the Association to elect its President from the Academy. We may view with great satisfaction the fact that the President of the National Academy is this year President of the Association.

In conclusion, we may once more urge the importance of attending the Detroit meeting of the Association and of proceeding thence to Toronto. Those taking part in these meetings will receive a stimulus in scientific activity, and by making the meetings noteworthy will contribute greatly to the advancement of science in America. Questions affecting the future of the Association will be considered at Detroit, and arrangements will be made for adequately celebrating the fiftieth anniversary of the Association. There is no doubt but that during the next fifty years science will be the leading factor in the progress of the world, and probably more depends on America than on any other country. The American Association for the Advancement of Science has great opportunities and great responsibilities.

THE INTERNATIONAL CATALOGUE OF SCIENTIFIC LITERATURE.

THE International Bibliographical Conference held in London, July 14-17, 1896, was the most important step ever taken toward international cooperation in scientific and bibliographical work. This account of the meeting is derived, unfortunately, not from personal knowledge, as I was not present. I have had, to aid me in its preparation, the two official publications

of the Conference, the so-called Acta and a verbatim report of the proceedings issued by the Royal Society, as well as information derived from the United States delegates, and the official correspondence of the Smithsonian Institution.

Before taking up the Conference itself, it might be well to consider briefly the history of the movement toward an international catalogue of scientific works. It is no small satisfaction to us that the incentive to this work came from America. Professor Joseph Henry first conceived a plan for a scientific bibliography in 1854, and when he sought the cooperation of the British Association for the Advancement of Science, the subject was referred to a committee consisting of Fellows of the Royal Society who approved the suggestion. Ten years later the Royal Society aided by government grant undertook the publication of a catalogue of scientific papers since 1800, 11 volumes of which have now appeared. In the preface to the first volume we read: "The present undertaking may be said to have originated in a communication from Dr. Joseph Henry, Secretary of the Smithsonian Institution, to the meeting of the British Association at Glasgow in 1855, suggesting the formation of a catalogue of philosophical memoirs."*

*"A communication from Professor Henry, of Washington, having been read, containing a proposal for the publication of a Catalogue of Philosophical Memoirs scattered throughout the Transactions of Societies in Europe and America, with the offer of cooperation on the part of the Smithsonian Institution, to the extent of preparing and publishing, in accordance with the general plan which might be adopted by the British Association, a Catalogue of all the American Memoirs on Physical Science, the Committee approve of the suggestion and recommend that Mr. Cayley, Mr. Grant and Professor Stokes, be appointed a committee to consider the best system of arrangement, and to report thereon to the Council." (Rept. of the 25th meeting of the British Association for the Advancement of Science, held at Glasgow in September, 1855, p. LXVI.)

In March, 1894, the Royal Society issued a circular to learned societies throughout the world, which called attention to the fact that the catalogue of scientific papers was limited to periodical scientific literature, taking no account of monographs and independent books and that titles were arranged solely by authors' names. Further, that the catalogue was confessedly incomplete. The development of scientific literature had been so great and the need for a subject catalogue so apparent that the President and Council of the Royal Society appointed a committee "to inquire into and report upon the feasibility of such a Catalogue being compiled through International Cooperation." A circular embodying these statements was sent to learned societies in correspondence with the Royal Society and elicited very general and favorable response. At the same time the following letter was addressed to the Smithsonian Institution:

"MY DEAR PROFESSOR LANGLEY: The Smithsonian Institution is, on historical grounds, so closely connected with the efforts of the Royal Society in cataloguing scientific papers that I am directed to add to the circular letter herewith sent, a few words expressing the hope of the Committee of the Royal Society which has the matter in hand that they may have, in a special way, the assistance of your valuable body in coming to a decision on so important a question. Believe me, yours very truly,

[Signed]

M. FOSTER,
Sec. R. S."

"This index of all the physical papers in the transactions of learned societies and in the scientific periodicals resulted from a letter addressed to the British Association in 1855, by the Secretary of this Institution, setting forth the advantages to science of such a work. The matter was referred to a committee of the Association, reported favorably upon, and recommended for execution to the Royal Society." (Smithsonian Report for 1867, p. 53.)

The matter occasioned much discussion both in this country and abroad. The circular was published in full in *SCIENCE*,* and there appeared in the same number a report of a committee of the Faculty of Harvard University to the University Council expressing its sympathy, making some suggestions and recommending that the corporation of Harvard University contribute a certain sum toward carrying out the enterprise.

Professor Henry A. Todd,† of Columbia University, made some suggestions in regard to a card catalogue of scientific literature with annotations. He proposed that the Smithsonian Institution should assume the leadership in America, and that publishers should be asked to co-operate.

Mr. W. J. McGee‡ discussed certain of the practical sides of the question, and announced that the Geological Society of America had concurred in the report of the Harvard University Council. The Franklin Institute, of Philadelphia, also expressed itself favorably.§

Doctor G. Brown Goode|| laid down a most careful plan of operations. He held that the catalogue should be international in name and scope, should be exhaustive within its own limits, and that it should be published in book form, as a card catalogue would, in his opinion, be too bulky. He also suggested a broad classification of science which, it may be said by way of anticipation, included economic science, mechanical science and engineering, philology and institutional history, all of which were excluded by the Conference.

Numerous other bodies responded favor-

ably and many articles were written on the subject.

The next step in the matter was taken when the Royal Society issued a circular in August, 1895, containing a report made to the President and Council in July, 1895, by the Special Committee. This circular stated that more than one hundred replies had been made to the original circular and that in no single instance was any doubt expressed as to the value of the work proposed. The cordial letter of the Secretary of the Smithsonian Institution and the replies received from the United States were especially dwelt upon, and the holding of an international conference as a first step in the matter was recommended by many Societies.

Accordingly, on August 15, 1895, the Secretary of the Royal Society addressed a letter to the Marquis of Salisbury, Premier and H. M. Minister for Foreign Affairs, in which he reviewed the matter and pointed out the advisability of a conference in London looking to international cooperation. He suggested that such a conference be called by the British government and that certain governments named should be invited.

In pursuance of this suggestion, the Department of State at Washington (and it may be assumed that a similar course was followed with regard to other countries) received from the British Ambassador, in October, 1895, a copy of the letter of the Royal Society, with the expression, on the part of Lord Salisbury, of the hope that the United States government would be represented at the conference. This matter was referred by the Secretary of State to the Secretary of the Smithsonian Institution, who recommended that the United States government should take part and suggested that Dr. John S. Billings and Professor Simon Newcomb should serve as delegates for the United States, a recommen-

* N. S., Vol. I., pp. 182-184.

† *SCIENCE*, N. S., Vol. I., p. 297.

‡ *SCIENCE*, N. S., Vol. I., p. 353.

§ *The Library Journal*, Vol. XX., p. 172.

|| *SCIENCE*, N. S., Vol. I., p. 433 'Ideal Index of Scientific Literature.'

dation which was adopted. The conference was formally held at London, July 14-17, 1896.

With this brief introduction I will now give: (1) a list of the governments represented by delegates; (2) a condensed account of such portions of the debates as would seem to be of especial bibliographical and scientific interest; (3) for the sake of clearness, a recapitulation of all of the resolutions agreed to with the exception of such as related purely to matters of detail concerning the holding of meetings, and (4) the report of the United States delegates, together with official documents relating thereto.

The following delegates attended:

Austria.—Prof. Ernst Mach (Mitglied der Kaiserlichen Akademie der Wissenschaften, Vienna). Prof. Edmund Weiss (Mitglied der Kaiserlichen Akademie der Wissenschaften, Vienna).

Belgium.—M. H. La Fontaine (Membre de l'Institut International de Bibliographie, Brussels). M. Paul Otlet (Membre de l'Institut International de Bibliographie). M. de Wulf (Membre de l'Institut International de Bibliographie).

Denmark.—Prof. Christiansen (Universitet, Copenhagen).

France.—Prof. G. Darboux (Membre de l'Institut de France). Dr. J. Deniker (Bibliothécaire, Muséum d'Histoire Naturelle, Paris).

Germany.—Prof. Walther Dyck (Mitglied der K. Bay. Akad. der Wiss. zu München). Prof. Dziatzko (Direktor der Universitäts Bibliothek, Göttingen). Prof. Van't Hoff (Mitglied der K. P. Akademie der Wissenschaften zu Berlin). Prof. Möbius (Mitglied der K. P. Akademie der Wissenschaften zu Berlin). Prof. Schwalbe (Direktor, Berlin).

Greece.—M. Avierinos M. Averoff (Greek Consul at Edinburgh).

Hungary.—Prof. August Heller (Librarian, Ungarische Akademie, Buda-Pesth). Dr. Theodore Duka (Membre Academie Hongroise des Sciences, Buda-Pesth).

Italy.—General Annibale Ferrero (Italian Ambassador in London).

Japan.—Assistant Prof. Hantaro Nagaoka (University, Tokio). Assistant Professor Gakutaro Osawa (Medical College, Tokio).

Mexico.—Senor Don Francisco del Paso y Troncoso.

Netherlands.—Prof. D. J. Korteweg (Universiteit, Amsterdam).

Norway.—Dr. Jorgen Brunchhøst (Secretary, Bergen Museum).

Sweden.—Dr. E. W. Dahlgren (Librarian, Kongl. Svenska Vetenskaps Akademie, Stockholm).

Switzerland.—M. C. D. Bourcart (Swiss Minister in London). Prof. Dr. F. A. Forel (President du Comité Central de la Société Helvétique des Sciences Naturelles).

United Kingdom.—Representing the government: Right Hon. Sir John E. Gorst, Q. C., M. P. (Vice-President of the Committee of Council on Education). Representing the Royal Society of London: Prof. Michael Foster (Sec. R. S.). Prof. H. E. Armstrong, F. R. S. Mr. J. Norman Lockyer, C. B., F. R. S. Dr. Ludwig Mond, F. R. S. Prof. A. W. Rücker, F. R. S.

United States.—Dr. John S. Billings (U. S. Army). Prof. Simon Newcomb, For. Mem. R. S. (U. S. Nautical Almanac Office).

Canada.—The Hon. Sir Donald A. Smith, G. C. M. G. (High Commissioner for Canada).

Cape Colony.—Roland Trimen, Esq., F. R. S. Dr. David Gill, C. B., F. R. S.

India.—Lieut.-General Richard Strachey, R. E., F. R. S.

Natal.—Walter Peace, Esq., C. M. G. (the Agent-General for Natal).

New South Wales.—Prof. Liversidge, F. R. S.

New Zealand.—The Hon. W. P. Reeves (Agent-General for New Zealand).

Queensland.—Chas. S. Dicken, Esq., C. M. G. (Acting Agent-General for Queensland).

The verbatim report of the debates, which accompanied the introduction of the resolutions, is much too voluminous to give even in abstract, but it would seem worth while at least to epitomize a few of the more salient points in the discussion which took place.

The attitude of the Royal Society toward the whole subject was sketched at the opening of the meeting by Professor Armstrong. The Society, he said, had felt for a number of years that in publishing a catalogue of scientific papers "it was not doing nearly enough to supply the needs of scientific workers; that the production of a catalogue arranged only according to the authors' names was altogether insufficient, and that it was essential that much more should be done, and that work should be

done much more quickly. * * * The great object before us is to produce a catalogue available for use by scientific investigators throughout the world. It is not a mere bibliographical work that we are seeking to perfect."

An interesting discussion took place on the motion of Professor Michael Foster, "that each delegate should have a vote in the deciding of questions before the Conference." Professor Simon Newcomb stated that it was not inappropriate that he should second the resolution, inasmuch as the United States would apparently be among the nations placed at the greatest disadvantage by this method of voting. Professor G. Darboux, a member of the Institute of France, representing the French government, said that he had sought instructions upon this subject, but had not received any; that in congresses of this sort votes were usually taken by nations and that if the other method was to have prevailed it should have been made known, so that more delegates could have been sent. General Ferrero, the Italian Ambassador at London, representing Italy, agreed that the observations of Professor Darboux were most important. He added, however, that with regard to questions which really are matters of science pure and simple it was the opinion of the delegates, not of nations, which was desired; while questions which were without the realm of science could readily be left to the governments to settle. In the question of classification, for example, there was no question of national interest; it was a question of science pure and simple.

Professor Möbius, representing Germany, said that the German delegates were sent by the German government or by learned societies to assist in the discussions, and to represent either the government or societies in order that they might determine in what manner they should participate in

the work. He held, therefore, that they should take part as individuals, which was agreed to by Professor Edmund Weiss, representing Austria.

Professor Darboux accepted this explanation, remarking that the matter was cleared up in his mind that the meeting was not a diplomatic conference, but a congress of scholars charged to examine into the best methods of accomplishing a certain proposition, and that the final questions of finance and participation were to be referred to the respective governments. The motion was then unanimously agreed to.

Professor Armstrong moved "that it is desirable to compile and publish, by means of some international organization, a complete catalogue of scientific literature arranged according both to authors' names and to subject-matter." This was adopted, with the last clause reversed, to read "both to subject-matter and to authors' names," in accordance with the suggestion of Professor Forel, representing Switzerland. M. Otlet, one of the Belgian representatives, took the introduction of this resolution as the occasion for the presentation of a note on behalf of the Belgian delegates. This note was in the nature of a discussion of the entire subject of international bibliographical work, with special reference to the establishment of an office at Brussels some years previous. The introduction of this note occasioned some discussion with regard to the decimal system of classification. Opinions against its practicability were expressed by Professor Schwalbe, of Germany; Professor Heller, of Hungary; Professor Dziatzako, of Germany, and Professor Darboux. The discussion, however, was brought to a close by the Italian representative calling attention to the fact that it did not bear directly on the resolution before the Congress.

The next resolution which occasioned

discussion read as follows: "That the administration of such a catalogue be entrusted to a representative body hereinafter called the International Council, the members of which shall be chosen as hereinafter provided by the several countries (hereinafter spoken of as the constituent countries) who shall declare their adhesion to the project."

Professor Korteweg, representing Netherlands, proposed an amendment, which was, in substance, that the preparation of the subject catalogue should be entrusted to an international commission representing the different branches of science and that this commission should nominate the International Council. He argued that different branches of science had different needs; that under this proposal it is possible that certain branches of science would not be represented at all, or at best very unequally. Professor Armstrong suggested that it would be well to settle the question in brief, leaving the further details until afterwards. Lieutenant-General Strachey, representing India, pointed out certain other difficulties in the wording of this resolution. Dr. J. S. Billings, of the United States of America, stated that the point raised by Professor Korteweg was so important that he should prefer to see it written down and be able to consider it. Professor Korteweg then withdrew his amendment. The form suggested by Dr. Billings was objected to by Professor Foster, on the ground that it did not provide that representatives of the several countries should be on this Council, to which Dr. Billings replied: "We are not trying so much to get representation of the countries in the first place. It would be a representation of the different branches of science. The countries come in as secondary to the sciences in this representative body." After some further discussion, the resolution, as amended by Dr. Billings, was adopted.

The next resolution read was: "That the final editing and the publication of the catalogue be entrusted to an organization hereinafter called the Central International Bureau, under the direction of the International Council." This resolution, Professor Armstrong explained, would only pledge the Conference to the organization of a central office and in no way preclude the establishment of branch offices. The discussion of this resolution, in connection with the following one, brought out the question from Professor Schwalbe as to what should be done to catalogue the literature of those countries which did not contribute or failed to adhere to the scheme; to which Professor Armstrong replied that in this event he thought the central office should carry out the work. Professor Dyck, representing Germany, thought that there should be a central office, but he raised the question as to whether the subordinate councils should not be considered by sciences instead of by countries. Professor Forel pronounced most emphatically for the arrangement by nationalities. M. Otlet, representing Belgium, was strongly in favor of a division into the sciences instead of by nationalities. He argued, first, that it would be very difficult for the smaller countries to organize a commission embracing all the sciences, and, secondly, that the various sciences were already so well organized, through national and international societies, that if the matter were arranged in this way these organizations would prove powerful auxiliaries. M. Darboux was strongly in favor of an arrangement by nations, pointing out that if the matter were left to some special organizations great difficulties would arise, as the limits between the sciences were hardly decided; "if, for example," he said, "you separate physics and chemistry you run the risk of entirely sacrificing the region intermediate between the two sciences, which is,

moreover, precisely the one in which the most interesting discoveries are being made." Professor Schwalbe gave as a further reason for adhering to nations that it would be easier for a national commission to get the material and, moreover, that in countries in which different languages were employed it would be easier to arrange for classifying the material in that way. The resolution was unanimously agreed to.

The next resolution proposed read as follows: "That any constituent country which shall declare its willingness to undertake the task shall be entrusted with the duty of collecting, provisionally classifying, and transmitting to the Central Office, in accordance with the rules laid down by the International Council, all the entries belonging to the scientific literature of that country, the work of the Central Bureau being in such cases limited to revising and incorporating into the catalogue the entries so received."

Dr. John S. Billings moved an amendment to have the word 'constituent' stricken out and have it read 'any country.'

Dr. Ludwig Mond proposed that the words "the work of the Central Bureau being, in such cases, limited to revising and incorporating into the catalogue the entries so received" be omitted. This motion, as amended, was unanimously agreed to.

The next resolution was: "That, in the classification according to subject-matter, regard shall be had not only to the title (of a paper or book), but also to the nature of the contents." Professor Armstrong explained that this meant that papers would have to be read and studied in order that proper indexes might be prepared. He said, further, that it was his belief that in the future it would be necessary to insist that the author of every paper supply with his paper the material for a subject-index, which, of course, could be revised at the

headquarters and subsequently at the Central Office. Dr. Billings moved that the word 'indexing' be substituted for 'classification,' which word he thought had been used wrongly. M. Deniker, representing France, pointed out that, while it was a comparatively simple matter to furnish titles, it was extremely difficult to analyze the contents. He asserted that a single article on zoology describing new species might require two hundred cards. M. Darboux seconded this observation. It is very necessary to zoology, he said, to know whether families or species were to be recorded. If the latter the number of cards would reach immense proportions, and he thought the success of the catalogue depended upon the solution of this question.

The next resolution was: "That the catalogue shall comprise all published original contributions to science, as hereinafter defined, whether appearing in periodicals or in the publications of societies, or as independent pamphlets, memoirs or books." Professor Armstrong pointed out that the object of this resolution was to include in the catalogue of the future all original scientific literature. He stated that in the past it had been the habit of the Royal Society to take note only of periodicals and of the publications of societies, so that the whole of Darwin's work which had not appeared in the publications of a society had been omitted, which was obviously absurd. Professor Newcomb objected to the words 'to science as hereinafter defined,' and suggested, 'to the branches of science hereinafter mentioned,' which suggestion was accepted. Professor Dziaitzko pointed out a difficulty. Periodicals, he said, can be procured through exchange, but the matter of books is a much more serious problem, as in the larger countries it would be difficult to get all the titles of books, not to speak of copies of the books themselves; in England, the United States and France this matter

could be arranged through the copyright, but in Germany the copyright had been left to the different states of the Empire and the regulations were different. In Saxony, which included the great publishing town of Leipzig, copies of books were not required to be furnished, and the same difficulty existed in Switzerland. Professor Schwalbe thought that absolute completeness would probably be impossible, mentioning by the way that even the daily newspapers occasionally contain articles of high value which would have to be considered. Professor Mach pointed out that in Austria it was compulsory to register and deposit books, and he expressed the hope that if the Congress came to a successful issue the various governments would enact laws making the deposit of books compulsory. Professor Korteweg suggested that one difficulty would be to make the proper distinction between original works and those which had only a pedagogical value. The elementary book must be omitted, yet there were among such books many that deserved a place. At all events, he thought it desirable to state the principle that pedagogical books on popular science should be excluded. Professor Newcomb thought that the necessary omissions would not materially detract from the value of the catalogue. "Naturally," he said, "every author, if he knows that this is the only way of making his work known, will send a copy to the Bureau, or take some means of making the Bureau aware of his work." Professor Armstrong thought that there would be no difficulty, because the proposed catalogue would serve as the best possible advertisement for the books. This resolution was unanimously agreed to.

The next resolution was a most important one, being designed to bring out the distinction between pure and applied science. As introduced it reads as follows: "That a contribution to science for the pur-

poses of the catalogue be considered to mean a contribution to any of the following sciences: mathematics, astronomy, physics, chemistry, geology, zoology, botany, physiology and anthropology, to the exclusion of what are sometimes called the applied sciences, the limits of the several sciences to be determined hereafter." Professor Schwalbe raised the question whether geography was to be considered one of the natural sciences. In Germany, he said, it was regarded not simply as an auxiliary to natural science, but as a science which of itself had relations to the whole series of natural phenomena, being related to anthropology and astronomy as well as to land surveys. He thought that geography was as much a science as chemistry or physics, and that even anthropology belonged to geography, except that portion of it which was related to anatomy. He was himself of the opinion that anthropology and geography had best be treated together. Professor Heller proposed, as a title, the 'physics of the earth,' stating that geography, meteorology and all sciences which had to do with the knowledge of the earth could be included under this title, excepting physics and astronomy. Mineralogy, he thought, could be treated as a separate science, while geography appeared to be only a portion of the science of the physics of the earth. Professor Christiansen, of Denmark, thought that it would be very difficult to define the different sciences, and that it would be best to take simply mathematics, astronomy, chemistry and botany. Professor Armstrong called attention to the fact that the question under discussion really was whether applied science was to be included. Professor Forel suggested that the phrase be simply 'physical and natural sciences, mathematics,' etc., which was agreed to by Professor Möbius, who remarked that historical studies would have to be omitted. Dr. Billings suggested

that the resolution should run: "mathematics, astronomy, physics, chemistry, geology and the biological sciences, including zoology, botany, morphology, physiology, anthropology, ethnology," etc. Dr. Billings did not think the term 'applied science' clear. In a sense astronomy is applied mathematics. He thought that some phraseology should be employed which indicates the application of sciences to professional and commercial purposes. He also called attention to statistics, which might be considered from a scientific point of view, and thought it well that the broader term biology should be introduced, instead of physiology or anthropology. Professor Möbius, after some further discussion of this resolution, pointed out that the term biology did not have the broad significance in Germany which Dr. Billings ascribed to it. The discussion of this resolution was adjourned for the day.

When the Conference met on the following day, July 15th, the mover of the resolution concerning the scope of the catalogue withdrew it by permission for the purpose of amendment. The discussion of this subject, which is really of much significance to scientific men, continued, and it was apparent that no conclusion could be reached. There seemed to be a tendency to use the words natural and physical sciences, thus leaving the whole matter indefinite. This Dr. Billings very strongly opposed on the ground that the statement as to the general scope of the catalogue should be in such form as to be perfectly clear to all scientific men. But it was evident that the question could not yet be settled, and it was finally decided to refer the terms of the resolution to a committee consisting of Professor Armstrong, Dr. Billings, Professors Möbius, Korteweg and Schwalbe.

The next matter that was of interest was a resolution which read: "That in judging

whether a publication is to be considered as a contribution to science, suitable for entry in the catalogue, regard shall be had to its contents, irrespective of the channel through which it is published." It is interesting to note that there was no dissent from this proposition, and that the importance of it was emphasized by the German delegates, several of whom pointed out the fact that trade journals, as, for instance, that devoted to the beet sugar industry, or even the *Allgemeine Zeitung*, often contain scientific articles of great value.

The next resolution, which was one of great importance, read: "That the double system of authors' names and subject-matter being always maintained, the Central Bureau shall issue the catalogue in the form of 'slips or cards,' the details of the cards to be hereafter determined and the issue to take place as promptly as possible. Cards corresponding to any one or more of the branches of science, or to sections of such branches, shall be supplied separately upon such demand." Dr. Ludwig Mond thought that the issuing of cards should be at the discretion of the International Council. Dr. Billings preferred that they should be at the discretion of the Central Bureau. He pointed out that it was a purely commercial detail, and that its advisability depended upon the number of subscriptions received in advance. He hardly thought that a double system was necessary in case of the cards. There was a lengthy discussion over various forms of amendment, that of Dr. Billings being finally carried by the rather close vote of 18 to 14.

The next resolution related to the issue of a catalogue in book form and this, too, being modified, was passed, as follows: "That the Central Bureau shall also issue the catalogue in book form from time to time, the titles being classified according to the rules to be hereafter determined; that the issue in the book form

shall be in parts corresponding to the several branches of science, the several parts being supplied separately, at the discretion and under the direction of the Central Bureau."

The President of the Conference next invited expressions of opinion as to where the Central Bureau should be situated. After a brief address, in which he referred to the fact that the International Bureau of Weights and Measures was established at Paris and the International Bureau of Geodesy at Potsdam, General Ferrero, representing Italy, proposed that the Central Bureau should be established at London. M. Darboux stated, on behalf of the French delegates, that they had been charged by their country to make the same proposition. Professor Möbius made a similar statement on behalf of the German delegates, and Professor Heller for Hungary, Professor Weiss for Austria, Professor Newcomb for the United States; and the representatives of Belgium, Switzerland, Denmark, Sweden and Netherlands agreeing, the resolution to have London as a central office was carried by acclamation. Professor Foster, Secretary of the Royal Society, acknowledged the extremely sympathetic manner in which this resolution had been proposed and carried.

The President of the Conference expressed his thanks on behalf of the British government for the unanimous action of the Conference, assuring them that nothing would be wanting in his country in the endeavor to make this international work a success.

He then invited an expression of opinion as to the constitution of the Council. Professor Foster remarked that there were several ways of electing a council. One was that there should be an appointment of international committees corresponding with the various branches of science and that these international committees should

nominate the council. Another plan was that each nation should nominate its members for the council directly. The German delegates stated that they had been directed, by the bodies they represented, to refer back to them the choice of persons for the international bureau. Professor Schwalbe agreed to this view, asserting that the right should be reserved to each government to name the persons who would represent it in carrying on the enterprise. Dr. Duka, representing Hungary, thought that this was a matter to be referred to the respective governments. Various delegates followed this idea, suggesting a postponement of the whole subject, but Professor Newcomb pointed out that inasmuch as this Conference had decided to appoint an international council it could not adjourn without indicating in some way the steps to be taken in the formation of the council. As a tentative proposition he, therefore, proposed the following resolution: "The International Council shall consist, in the first place, of members, one of whom shall be appointed by the government of each country taking part in the preparation of the catalogue. The Council as thus formed shall have power to choose such additional members as it shall deem necessary for the efficiency of its organization." Dr. Billings noted a difficulty in the use of the word government. He said it might very well happen in the United States that the government might have nothing to do with the preparation of the catalogue; that it might come under such bodies as the National Academy of Sciences or the Smithsonian Institution, which could not be said to be the government of the United States. General Ferrero agreed with the suggestion of Dr. Billings, thinking that it might be better for the enterprise if the choice of the delegates were left to some scientific body. M. Darboux thought that

everybody would agree that the nomination should be by the government. Professor Dziatzko proposed that the Conference should appoint a provisional committee, which should enter into communication with various governments and learned societies and thus prepare for a second conference which would settle all details. General Ferrero thought that the Royal Society could itself take the place of the provisional committee suggested by Professor Newcomb, but no definite agreement was arrived at on this point, and the Conference adjourned for the day.

On Thursday, July 16th, the Conference again assembled, and the special order was the report of the committee for the purpose of considering a resolution to indicate the nature of the subjects to be admitted to the catalogue. This committee reported as follows: "That a contribution to science for the purpose of the catalogue be considered to mean a contribution to the mathematical, physical, or natural sciences, such as, for example, mathematics, astronomy, physics, chemistry, geology, mineralogy, zoology, anatomy, botany, physiology, general and experimental pathology, experimental psychology, and anthropology, to the exclusion of what are sometimes called the applied sciences, the limits of the several sciences to be determined hereafter." Professor Möbius called attention to the fact that experimental psychology was known in Germany as psycho-physics, and it was agreed to insert that word in the German text. Professor Forel and the Italian Ambassador favored the inserting of mathematical and physical geography, which was agreed to. M. Otlet suggested the insertion of paleontology, but several members insisted that this was included under zoology.

This matter, which threatened to cause considerable trouble being disposed of, the resolution of Professor Newcomb respecting the constitution of an International Council

was taken up, and with the permission of the Conference his resolution was withdrawn in order that another one, which had received fuller consideration, should be admitted. Professor Foster said that he understood it to be the view of the Conference to remit the question to the Royal Society. He said that while the Society would be very proud to accept any duty which might be imposed upon them they would shrink from any executive power in connection with the matter. It had been suggested that this organizing committee of the Royal Society should report to a future meeting of the Conference, but this was objected to by several persons on the ground that when the Conference was adjourned it ceased to be, so that a future Conference was suggested. One of the longest discussions of the entire meeting now followed, but it related largely to questions of diplomacy and policy and may well be omitted here. After many amendments the resolution read: "That the Royal Society be requested to form a committee to settle the questions relating to the catalogue referred to it by the Conference, or remaining undecided at the close of the present sittings of Conference, and to report thereon to the governments concerned."

The next important matter was the introduction of the following resolution: "That whatever system of classification be ultimately adopted for the catalogue it is impossible to accept the Dewey system *en bloc*." By way of explanation of this resolution Professor Armstrong said that he had put it in this form because the International Conference of Bibliography at Brussels had accepted the Dewey system and because it was so widely used in certain libraries. The Royal Society, while not denying the merits of the system for the librarian's use, held that it was impossible to accept it for the purpose of scientific workers. M. Otlet favored the Dewey system. Professor

Heller thought it not practicable for the purpose and favored the remission of the whole question to the committee. Professor Mach stated that as soon as he had thoroughly learned the Dewey system he had become a supporter of it and was of the opinion that some modification of the decimal system would be the best. Professor Dziatzko asserted that the Dewey system was not practicable even for large libraries. M. Otlet then spoke in favor of the Dewey system and explained the reason for its adoption by the Brussels Bibliographical Bureau.

Dr. Billings then spoke on the subject, delivering the longest address of the Conference. He said that the decimal system, known as the Dewey system, was a device for putting books in order on the shelves and a rapid method of finding them. It was simply a shorthand method of finding a book. The application of it to systematic catalogues was a different proposition. He asserted that the Dewey system is not accepted in any government library in the United States, or in any university library in the United States except Albany and Columbia, in both of which Mr. Dewey has been librarian. He said that less than 100 libraries were using the Dewey system and only about 32 the Cutter system. The Dewey system, however, was likely to grow because many young women who had been trained in Mr. Dewey's library school had taken charge of the catalogues of the smaller libraries in the United States, and the Library Bureau which had been founded by Mr. Dewey was providing a large series of useful appliances for librarians. He added: "I, for one, am disposed to award the greatest credit and admiration to Mr. Dewey, not only for the ingenuity which he has shown in this and other matters pertaining to library economy, but also for the ceaseless energy, zeal and persistence in getting the matter before the world and in having

his ideas adopted as far as possible. I like to see a man believe himself, and in his own opinions, and do the best he can to put them into operation." He added, however, that the New York libraries, the Boston Public Library and the Boston Athenæum did not use the system and that it was not practicable for a systematic catalogue, even admitting its usefulness for the arrangement on the shelves.

Professor Schwalbe pointed out that even for library work the decimal system had many opponents, and he thought that some alphabetical system would be found the most practicable. Dr. Gill, representing Cape Colony, said that while the motion had brought out a good deal of condemnation of the Dewey system he had noticed that no other system had been put forward as perfect. Professor Armstrong said in reply that he did not think any other system was perfect, but that the object of the resolution was to put the matter in such shape as to leave entire freedom for action. Some considerable discussion followed without result, and Dr. Billings suggested that he would like to have a resolution of more practical value than the mere condemnation of one particular man's system. A long discussion followed on this point without result until Dr. Billings suggested that his object was to "get a declaration on the part of the conference that minute classification by means of symbols is not desirable in a catalogue. It is my opinion that no arrangement of the decimal system which you can propose, whether formed by Dewey or by others, is desirable." After some further discussion it was decided to adjourn until the next day, and on the morning of July 17th the resolution of the previous day was withdrawn and the following substituted: "The Conference, being unable to accept any of the systems of classification recently proposed, remits the study of classification to the Committee on Organization." This

resolution was seconded by Dr. Billings, who remarked that, inasmuch as one or two of his remarks of the day previous had been misunderstood by some members of the Congress, he wished distinctly to say that he did not condemn the Dewey decimal system for the classification and location of books, but he did not think it well adapted to the catalogue which it was proposed to publish. This resolution was now agreed to unanimously, the Belgian delegates desiring it to be placed on record that they abstained from voting.

Professor Deniker, representing France, now proposed: "That the catalogue according to the authors' names be in the English language, all titles to be also in their original language, unless otherwise desired by the Bureau of the country concerned." This resolution was seconded by General Ferrero, the Italian Ambassador. Professor Forel said that the question of language was one of very great importance, and he thought it should be remitted to the Committee of Organization, suggesting the following proposition: "With the questions of classification and form, the questions of the employment of four languages, German, English, French and Italian, shall be remitted to the Committee of Organization." Professor Mach, representing Austria, favored the employment of English as the only language, asserting that English is so widely spoken over the civilized world that it would be most proper to employ that language. "Every one," he said, "should respect his own nationality and his own language, but before that he should consider the universal interest of mankind." General Ferrero said that he supported the motion to use the English language because of precedent and of practicability. The official language of an international bureau should be the language of the country in which it is established; the Commission of Weights and Measures at Paris issued its

publications in French, the Geodetic commission at Berlin in German. Professor Newcomb did not think it necessary to translate the titles of papers written in German, French or Italian into English. The discussion continued, many delegates taking part, until finally the following form was agreed upon: "That English be the language of the two catalogues authors' names and titles being given only in the original languages, except when this belongs to a category to be determined by the International Committee."

There was some little discussion as to whether the catalogue should begin January 1, 1900, or 1901, but the date 1900 was finally agreed to.

Professor Forel now made the following motion: "That when the organization for the catalogue is finally established it will be desirable to take in hand the publication of retrospective catalogues, carried out on the same plan, going back from century to century, as far back as the invention of printing." Dr. Billings objected to this resolution. He held that it was not the business of the Conference to say what was desirable, but what was possible; that the Conference wanted to have the reputation of being a fairly sensible set of men who had not proposed to do anything which was beyond the reach of human effort properly organized. After further expressions of disapproval this resolution was withdrawn. The Conference then adjourned, with the customary votes of thanks.

Having adjourned, all the delegates presumably returned to their respective countries and made reports to their governments. The American delegates, Professor Simon Newcomb and Dr. John S. Billings, presented their report to the Secretary of State on October 15, 1896. On the following day the Secretary of State referred this report, in accordance with

the suggestion of the delegates, to the Secretary of the Smithsonian Institution, and asked for his views as to the propriety and feasibility of the work in question being undertaken by the Smithsonian Institution, and as to the probable cost, with a view to the departments taking the necessary action. A reply was forwarded to the Secretary of State and these documents transmitted by him to the Senate and House of Representatives. This was done on December 17, 1896.* Naturally enough no result has been reached. No money will be required until the year 1899-1900. But, in accordance with the terms of one of the articles, it is necessary that the countries which intend to adhere to the scheme should make their intention known before 1898. It is, therefore, most desirable that the first regular session of the 55th Congress should place itself on record as pledging the government of the United States to adhere to this plan, than which none has ever been proposed better calculated to promote the interest of science.

I cannot conclude without expressing my gratification, which I feel sure all your readers will share, in the honorable part taken by the United States in initiating this enterprise. It is but due to Dr. Billings and Professor Newcomb to recognize the great usefulness of their presence in aiding in the deliberations. Dr. Billings's long experience in bibliographical work gave his numerous recommendations great weight and they were uniformly adopted. The honor of American science demands that this country shall do its share toward bringing the proposed International Catalogue of Scientific Literature to a successful issue.

CYRUS ADLER.

SMITHSONIAN INSTITUTION,
WASHINGTON, D. C.

* The documents are appended.

APPENDIX.

The following is a selection from the resolutions agreed to :

4. That each delegate shall have a vote in deciding all questions brought before the Conference.

5. That English, French and German shall be the official languages of the Conference, but that it shall be open for any delegates to address the Conference in any other language, provided that he supplies for the *procès verbal* of the Conference a written translation of his remarks into one or other of the official languages.

6. General Ferrero moved that Sir John E. Gorst be the President of the Conference. The motion having been unanimously accepted,

7. Sir John Gorst nominated as Vice-Presidents: General Ferrero, Professor Darboux, Professor Mach, Professor Möbius, Professor Newcomb. It was further resolved :

8. That Professor Armstrong be the Secretary for the English Language ; that Professor Forel be the Secretary for the French language ; that Professor Dyck be the Secretary for the German language.

9. That the Secretaries, with the help of shorthand reporters, be responsible for the *procès verbal* of the proceedings of the Conference in their respective languages.

12. That it is desirable to compile and publish by means of some international organization a complete Catalogue of Scientific Literature, arranged according to both subject-matter and to authors' names.

13. That in preparing such a catalogue regard shall, in the first instance, be had to the requirements of scientific investigators, to the end that these may, by means of the catalogue, find out most easily what has been published concerning any particular subject of inquiry.

14. That the administration of such a catalogue be entrusted to a representative body, hereinafter called the International Council, the members of which shall be chosen as hereinafter provided.

15. That the final editing and the publication of the catalogue be entrusted to an organization, hereinafter called the Central International Bureau, under the direction of the International Council.

16. That any country which shall declare its willingness to undertake the task shall be entrusted with the duty of collecting, provisionally classifying, and transmitting to the Central Bureau, in accordance with rules laid down by the International Council, all the entries belonging to the scientific literature of that country.

17. That in indexing according to subject-matter regard shall be had, not only to the title (of a paper or book), but also to the nature of the contents.

18. That the catalogue shall comprise all published original contributions to the branches of science hereinafter mentioned, whether appearing in periodicals or in the publications of societies or as independent pamphlets, memoirs, or books.

20. That in each country the system of collecting and preparing material for the catalogue shall be subject to the approval of the International Council.

21. That in judging whether a publication is to be considered as a contribution to science suitable for entry in the catalogue, regard shall be had to its contents, irrespective of the channel through which it is published.

22. That the Central Bureau shall issue the catalogue in the form of 'slips' or 'cards,' the details of the cards to be hereafter determined, and the issue to take place as promptly as possible. Cards corresponding to any one or more branches of science, or to sections of such sciences, shall be supplied separately and under the direction of the Central Bureau.

23. That the Central Bureau shall also issue the catalogue in book form from time to time, the entries being classified according to the rules to be hereafter determined.

That the issue in the book form shall be in parts corresponding to the several branches of science, the several parts being supplied separately, at the discretion and under the direction of the Central Bureau.

24. That the Central Bureau be located in London.

The resolution was seconded by M. Darboux, supported by Messrs. Möbius, Heller, Weiss, Simon, Newcomb, Otlet, Duka, Bourcart, Dahlgreen and Korteweg, and accepted by acclamation.

25. That a contribution to science for the purpose of the catalogue be considered to mean a contribution to the mathematical, physical, or natural sciences, such as, for example, mathematics, astronomy, physics, chemistry, mineralogy, geology, botany, mathematical and physical geography, zoology, anatomy, physiology, general and experimental pathology, experimental psychology and anthropology, to the exclusion of what are sometimes called the applied sciences—the limits of the several sciences to be determined hereafter.

26. That the Royal Society be requested to form a committee to study all questions relating to the catalogue referred to it by the Conference, or remaining undecided at the close of the present sittings of the Conference, and report thereon to the governments concerned.

27. Since it is probable that, if organizations be established in accordance with Resolution 16, the Guarantee Fund required for the Central Bureau can be supplied by voluntary subscriptions in various countries, this Conference does not think it necessary

at present to appeal to any of the governments represented at the Conference for financial aid for the Central Bureau.

28. The Conference being unable to accept any of the systems of classification recently proposed, remits the study of classifications to the Committee of Organization.

29. That English be the language of the two catalogues, authors' names and titles being given only in the original languages except when these belong to a category to be determined by the International Council.

30. That it be left to the Committee (of the Royal Society) to suggest such details as will render the catalogue of the greatest possible use to those unfamiliar with English.

31. That it is desirable that the Royal Society should be informed, at a date not later than January 1, 1898, what steps (if any) are being taken, or are likely to be taken, in the countries whose governments are represented at the Conference, towards establishing organizations for the purpose of securing the end had in view in Resolution 16.

32. That the delegates in reporting to their respective governments the proceedings of the Conference should call immediate attention to Resolutions 16 and 31.

33. That January 1, 1900, be fixed as the date of the beginning of the catalogue.

34. That the Royal Society be requested to undertake the editing, publication and distribution of a verbatim report of the Proceedings of the Conference.

35. That the proces verbal of the Conference be signed by the President and Secretaries.

Letter from the Secretary of State, transmitting with the draft of a proposed joint resolution and inclosures from the Secretary of the Smithsonian Institution, recommendations for an appropriation to enable the United States to participate in the work of making an International Catalogue of Scientific Works.

DEPARTMENT OF STATE,
Washington, December 17, 1896.

SIR: I have the honor to transmit, herewith, the report of Professor Simon Newcomb and Dr. John S. Billings, delegates from this country to the International Conference on a Catalogue of Scientific Literature, held in London in July last by request of the Royal Society, and having for its object an international agreement as to the steps necessary to the preparation, editing and continuous publication of the current scientific literature of all countries.

It will be seen that by the thirty-second resolution formulated by the Conference the delegates were especially requested to bring the following two resolu-

tions to the attention to their respective governments:

16. That any country which shall declare its willingness to undertake the task shall be entrusted with the duty of collecting, provisionally classifying, and transmitting to the Central Bureau, in accordance with rules laid down by the International Council, all the entries belonging to the scientific literature of that country.

31. That it is desirable that the Royal Society should be informed, at a date not later than January 1, 1898, what steps, if any, are being taken, or are likely to be taken, in the countries whose governments are represented at the Conference, toward the establishing of organizations for the purpose of securing the end had in view in Resolution 16.

In the opinion of Professor Newcomb and Dr. Billings, it is desirable that the government of the United States should take its part in the proposed work by providing for the continuous cataloguing of scientific papers published in the United States, and they suggest the propriety and feasibility of the work being undertaken by the Smithsonian Institution.

Professor S. P. Langley, Secretary of that Institution, to whom I have submitted the report of the delegates, concurs in their view as to the great importance of a successful execution of the conclusions of the Conference, and as to the propriety of this government taking its share of the proposed work by providing for the cataloguing of scientific publications of the United States. He recognizes the propriety also of the suggestion that this government should employ the Smithsonian Institution as an agent in the matter, but points out that the work if assigned to the Smithsonian would require a person of special qualifications to immediately assist the Secretary, together with a number of trained clerical assistants, and that the salaries of these persons, and the expenses incident to the work, would require an appropriation of not less than \$10,000 per annum. I enclose a copy of Professor Langley's letter on the subject.

The most efficient means for the purpose would seem to be a joint resolution of both Houses of Congress, and I have the honor to suggest the inclosed draft as embodying Professor Langley's views.

I have the honor to be, sir, your obedient servant,

RICHARD OLNEY.

HON. THOMAS B. REED,

Speaker of the House of Representatives.

WASHINGTON, D. C., October 15, 1896.

SIR: The undersigned having been appointed by the Honorable the Secretary of State delegates to the International Conference on a Catalogue of Scientific Literature, held in London in July last by request of the Royal Society, and having performed the duty thus devolving upon them, have the honor to submit the following report on the subject:

The object of the Conference was to reach an international agreement as to the steps necessary to the preparation, editing and continuous publication of a catalogue of the current scientific literature of all countries. The need of such a catalogue has been felt from the time that the volume of published scientific researches began to assume its present colossal proportions. About 1860 the Royal Society undertook to supply this need by the preparation of a general catalogue of scientific papers. The first volume of this work appeared in 1867. In the preface it is stated that the undertaking originated in a communication from Dr. Joseph Henry, Secretary of the Smithsonian Institution, to the meeting of the British Association at Glasgow in 1855, suggesting the formation of a catalogue of philosophical memoirs.

This work has been completed by the Royal Society up to the year 1883. In the meantime, owing to the constant increase of the volume of published researches, the task of continuing the catalogue has become so heavy that the Royal Society should no longer be expected to bear the entire burden of its continuance. Moreover, in its present form, the catalogue is arranged solely according to authors' names. In order that the work of the future should be entirely satisfactory it is necessary that the catalogue should also be arranged according to subjects.

Under these circumstances, the Royal Society last year moved the British government to make application to the governments of those countries most interested to send delegates to an international conference on the subject, to be held in London in July, 1896. At this meeting nearly all the leading countries of the world were represented. From the beginning the views were found to be substantially harmonious so far as general conclusions were concerned, and the discussion turned rather upon the form than upon the substance of the proposition submitted. The conclusions as finally formulated are embodied in the enclosed copy of the acta.

It will be seen by the thirty-second resolution the delegates were especially requested to bring the following two resolutions to the attention of their respective governments:

16. That any country which shall declare its willingness to undertake the task shall be entrusted with the duty of collecting, provisionally classifying, and transmitting to the Central Bureau, in accordance with rules laid down by the International Council, all the entries belonging to the scientific literature of that country.

31. That it is desirable that the Royal Society should be informed at a date not later than January 1, 1896 (1897),* what steps, if any, are being taken,

* The report of the Conference gives the date January 1, 1898.

or are likely to be taken, in the countries whose governments are represented at the Conference, toward establishing organizations for the purpose of securing the end had in view in Resolution 16.

Under these circumstances it seems especially desirable that the government of the United States should take its part in the proposed work by providing for the continuous cataloguing of scientific papers published in the United States. It can for this purpose call to its aid a national institution well prepared to direct and supervise the undertaking. The Smithsonian Institution, founded by private munificence for the increase and diffusion of knowledge among men and placed in trust under the government of the United States, was the original proposer of the undertaking now under consideration, and has been made the agent of the government in the direction of important scientific enterprises. We would, therefore, respectfully suggest that the Department of State communicate with the Secretary of the Smithsonian Institution upon this subject, more especially as to the propriety and feasibility of the work being undertaken by that Institution and as to the probable expense, and that when these facts are ascertained the matter will be laid before Congress with such recommendation as the Department, in its wisdom, may deem appropriate.

Very respectfully, your obedient servants,

SIMON NEWCOMB,
JOHN S. BILLINGS.

The SECRETARY OF STATE,
Department of State, Washington, D. C.

SMITHSONIAN INSTITUTION,
Washington, October 27, 1896.

SIR: I have the honor to acknowledge the receipt of your communications of the 16th and 21st instant, inclosing copies of a report of the delegates of this government to the International Conference on a Catalogue of Scientific Literature, summoned in London by the British government at the request of the Royal Society in July last, and inviting an expression of my opinion as to the propriety and feasibility of the United States taking part, through the Smithsonian Institution, in the proposed work by providing for the continuous cataloguing of scientific literature published in the United States, as suggested by the delegates, and further requesting an estimate of the probable expense attendant thereto.

I fully concur in the view of the delegates as to the great importance of a successful execution of the conclusions of the Conference, and as to the propriety of this government taking its share of the proposed work by providing for the cataloguing of the scientific publications of the United States. This opinion is strengthened by the fact that the recommendations

made are due to results emanating from the International Conference, at which the United States was officially represented, and by the further considerations that the benefits to be derived from this undertaking are not only great and far-reaching for the scientific progress of America, but also of universal value, and that all the great and many of the smaller nations will take part in the work.

I recognize also the propriety of the suggestion that the government should employ the Smithsonian Institution as an agent in this matter, particularly since the Institution, as the delegates have pointed out, first suggested this subject in 1855, and since it has been from its earliest organization interested in scientific bibliography.

I should, however, be reluctant to commit the Institution to the appearance of soliciting Congress in this matter in any case, or to the undertaking of the enterprise, however worthy, unless provision could be made for the necessary expenses of the work. After considering the subject, it seems to me that the work, if assigned to the Smithsonian Institution, would require a person of special qualifications to immediately assist the Secretary, together with a number of trained clerical assistants, and that the salaries for these persons and the expenses incident to the work would require an appropriation of not less than \$10,000 per annum.

Expenditures on this appropriation would probably not need to be available before the fiscal year commencing July 1, 1899, though it would seem to be advisable that if the government is to cooperate in the proposed work there should be some earlier assurance of this.

Should the views here given meet with your approval, I venture to express the hope that the Department of State will bring this matter to the attention of the President for transmission to Congress, as was done on a previous occasion when the Institution was requested to assume the care of the international exchange of publications in behalf of the government.

I have, etc.,

S. P. LANGLEY,
Secretary.

HON. RICHARD OLNEY,
Secretary of State.

Resolved by the Senate and the House of Representatives of the United States of America in Congress assembled, That for the purpose of carrying out on the part of the United States the recommendation of the International Conference on a Catalogue of Scientific Literature, held in London in July, eighteen hundred and ninety-six, the sum of ten thousand dollars, or so much thereof as may be necessary, be, and the same is hereby, appropriated, out of any money in the Treasury not otherwise appropriated, for the

expense of clerk hire and the other expenses incident to the work of cataloguing the scientific publications of the United States, the same to be expended under the direction of the Secretary of the Smithsonian Institution.

BRITISH ASSOCIATION, TORONTO MEETING.

THE second Canadian meeting of the British Association will commence in Toronto August 18th, and will continue for eight days. Present indications are that a very large number of British visitors will be in attendance, amongst whom will be found some of the most representative men of British science. About twenty Continental savants, also of representative character, will attend.

Arrangements have been made by the Council of the British Association whereby the members of the American Association are entitled to become annual members of the British Association on the payment of a fee of \$5.00. Those who are not members of the American Association can become annual members on the payment of \$10.00 or associate members on payment of \$5.00. Arrangements are now made whereby the application for membership can be made to one of the local Treasurers of the Association, Mr. James Bain, British Association office. For the convenience of Americans who propose to attend the Toronto meeting, a list of lodgings and apartments as well as a list of hotels has been published and copies of these may be had upon application to the local Secretaries at Toronto. American members of the British Association are entitled to travel in Canada east of Port Arthur at half the usual charge for first-class tickets, this privilege beginning on July 1st and expiring on September 30th. In order to enable the members to receive this privilege they must be provided with what is called a railway certificate, which can be had on personal application to the local officers at Toronto or to the railway officers at Montreal. The presentation of

this certificate at any office will at once enable the holder of it to receive reduced railway rates. Such members also will be entitled to reduced rates for a trip over the Canadian Pacific Railway from Toronto to points in western Canada. The rate from Toronto to the Pacific coast and return varies from \$61.80 to 70.30, according to the route selected. This does not include the Pullman fare, for which an extra charge will be made.

The various excursions which are arranged for will take place either during the meeting from Saturday, August 21st, to Monday, August 23d, or immediately after it, on Thursday, 26th, 27th and 28th, and will be made at reduced rates. The excursion to Muskoka, which will be for about four hundred, embracing a run of a hundred and ten miles by rail, with a sail over the Muskoka lakes, will cost \$1.65. The excursion from Toronto to Niagara will cost \$1.25.

The office of the British Association, will be in the University of Toronto building. All the meetings of the Association excepting those for the President's address and the two evening lectures, will be held in the lecture rooms and laboratories of the University of Toronto. The President's address is to be delivered in Massey Hall, where also will be given the two evening lectures by Professor John Milne and Professor Roberts-Austen. The free lectures on Borneo to artisans will be given by Dr. H. O. Forbes, in the Horticultural Pavilion.

According to the scheme of the local provisional program, the time of the members will be pretty fully occupied. The first General Committee meeting of the Association will take place on the afternoon of Wednesday, August 18th. The President's address will be delivered on the evening of the same day. The Sections will meet on Thursday, August 19th, and the addresses of the Presidents will be then given. In the afternoon of the same day

there will be a large garden party given at the Royal Canadian Yacht Club, Toronto Island. His Excellency, the Governor-General, and the Countess of Aberdeen will in the evening give a reception to the members in the Parliament buildings of the Province of Ontario. On Friday there will be meetings of the Sections until about three o'clock, when there will be a Convocation of the University of Toronto to confer the Honorary Degree of Doctor of Laws upon Lord Kelvin, Lord Lister, Sir John Evans and the President of the American Association, Professor Wolcott Gibbs. After Convocation is over there will be several garden parties for the members. In the evening will be the lecture of Professor Roberts-Austen, F. R. S., on 'Canada's Metals.' This will be illustrated by demonstrations of electric furnaces in the reduction and separation of the various metals. On Saturday morning the Sections will meet and adjourn early, in order that the members may take the various excursions which are arranged for from Saturday to Monday. The members will be offered a choice in these, there being four routes, one to Muskoka, the lake region of Canada, a second to Niagara Falls, a third to Hamilton and Dundas, thence to Niagara Falls, a fourth to Georgian Bay. The members of the Geological Section are to visit and examine the Niagara Gorge, under the guidance of Messrs. G. K. Gilbert, J. W. Spencer and F. B. Taylor, all of whom have given special attention to the geology of the Niagara region. Arrangements are being made whereby members of this party will have an opportunity of going up by the Gorge Railway and returning by the Niagara Falls and Victoria Park Railway or *vice versa*. These two trips will enable them to cover all the special points of interest in connection with the much debated geology of Niagara Falls.

Members of the Section for Mechanical

Science will also visit Niagara to examine the Hydraulic Companies' works and the plant for the manufacture of carborundum. The various Hydraulic Power Companies have extended a special invitation to the members of the Association, and it is expected that a large number will avail themselves of the privilege accorded. It is probable that amongst the visitors on this occasion will be a large number of the most eminent electricians and engineers.

The excursionists to Muskoka will stay at the various hotels and lodging houses in the Muskoka region over Sunday. Another party will have an opportunity of visiting the many thousand islands in Georgian Bay. This group will go partly by rail to Penetang, thence by boat through Georgian Bay to Parry Sound, returning on Monday morning. On Monday the majority of the Sections will again meet. On Monday afternoon the Geological Section will examine the glacial region of Scarboro' Heights and the Don Valley, which are of special interest to students of the glacial age, the deposits there being very extensive and of great thickness. A number of garden parties are also arranged for the members during this afternoon.

In the evening Professor John Milne, F.R.S., recently of the University of Tokyo, will deliver an illustrated lecture with demonstrations on 'Earthquakes and Volcanoes.' On Tuesday morning the Sections will again meet. In the afternoon there will be a Convocation of Trinity University to confer the Honorary Degree of D.C.L. on Lord Lister, Sir John Evans and Professor Forsyth, this ceremony being followed by several garden parties. In the evening there will be a *Conversazione* with music and refreshments in the main building of the University of Toronto for all the members of the Association. On Wednesday the Sections will meet for their con-

cluding meeting, and in the afternoon the second and last general meeting of the Association will take place. In the evening a banquet will be given in honor of Lord Kelvin, Lord Lister and Sir John Evans, at which there will probably be in all about four hundred guests. It is proposed to reserve a number of tickets, about seventy-five, for those who may not have an opportunity of claiming one at an earlier date.

The full number of Sections will meet at Toronto. Within the last few years the number has increased from eight to ten, the increase being due to the removal of Physiology and Botany from Section D (Biology), which is now called Zoology. Section I (Physiology) only meets where there is a physiological laboratory, and consequently it will be in session at Toronto. The Presidents of the various Sections have been specially chosen for the Toronto meeting: Professor Forsyth, D.Sc., F.R.S., of the University of Cambridge, for Mathematics (Section A); Professor William Ramsay, Ph.D., F.R.S., for Section B (Chemistry); Dr. G. M. Dawson, C.M.G., F.R.S., Director of the Dominion Geological Survey for Section C (Geology); Professor L. C. Miall, F.R.S., F.L.S., for Section D (Zoology); Dr. J. Scott Keltie, Sec. R.G.S., for Section E (Geography); Professor Gonner, M.A., for Section F (Economic Science and Statistics); G. F. Deacon, M.Inst.C.E., for Section G (Mechanical Science); Sir William Turner, F.R.S., for Section H (Anthropology); Professor Michael Foster, Sec. R.S., for Section I (Physiology); Professor H. Marshall Ward, F.R.S., for Section K (Botany).

Amongst the British members who have promised to attend are the following:

Professor W. E. Ayrton, F.R.S., City and Guilds of London Institute.
 Professor Henry E. Armstrong, Ph.D., LL.D., F.R.S., City and Guilds of London Institute.
 E. W. Brabrook, F.S.A., London.

Colonel F. Bailey, Sec. R.Scot.G.S., F.R.G.S., Edinburgh.

Professor F. O. Bower, D.Sc., F.R.S., The University, Glasgow.

Professor W. F. Barrett, F.R.S.E., M.R.I.A., Royal College of Science, Dublin.

J. T. Bottomley, D.Sc., F.R.S., The University, Glasgow.

Professor T. Hudson Beare, M.Inst.C.E., F.R.S.E., University College, London.

Professor Francis Gibson Bailey, Heriot Watt College, Edinburgh.

Professor C. V. Boys, F.R.S., Royal College of Science, London.

The Right Hon. James Bryce, M. P., London, Eng.

Professor Rubert Boyce, M.D., University College, Liverpool.

G. F. Deacon, M.Inst.C.E., London, Eng.

Harold B. Dixon, M.A., F.R.S., F.C.S., Owens College, Manchester.

Sir John Evans, K.C.B., D.C.L., LL.D., D.Sc., Treas. R.S., F.S.A., F.L.S., F.G.S., etc., Nash Mills, Hemel Hempstead, Eng.

Professor J. A. Ewing, M.A., B.Sc., F.R.S., F.R.S.E., M.Inst.C.E., University of Cambridge.

Professor A. R. Forsyth, M.A., D.Sc., F.R.S., University of Cambridge.

Professor C. Le Neve Foster, B.A., D.Sc., F.R.S., F.G.S., Royal College of Science, London.

Professor G. Carey Foster, F.R.S., F.C.S., University College, London.

Professor Michael Foster, M.A., M.D., LL.D., D.C.L., Sec. R.S., F.L.S., F.C.S., University of Cambridge.

Hon. Sir. C. W. Fremantle, K.C.B., London.

Henry O. Forbes, LL.D., F.Z.S., The Museums, Liverpool.

Professor George F. Fitzgerald, D.Sc., F.R.S., Trinity College, Dublin.

Professor J. Reynolds Green, B.Sc., F.R.S., F.L.S., Professor of Potany to the Pharmaceutical Society of Great Britain.

Walter H. Gaskell, M.D., LL.D., F.R.S., Cambridge.

Professor A. G. Greenhill, M.A., F.R.S., Artillery College, Woolwich, Eng.

Professor E. C. K. Gonner, M.A., University College, Liverpool.

E. Sidney Hartland, F.S.A., Henry Higgs, LL.B., F.S.S.

Professor W. H. Heaton, University College, Nottingham.

Professor W. A. Herdman, F.R.S., D.Sc., F.R.S.E., University College, Liverpool.

Alfred C. Haddon, M.A., F.G.S., Cambridge.

Professor W. O. Halliburton, M.D., F.R.S., King's College, London.

A. Vernon Harcourt, D.C.D., LL.D., F.R.S., Cowley Grange, Oxford.

L. F. Vernon Harcourt, M.A., M.Inst.C.E., London, Eng.

J. Scott Keltie, LL.D., Sec. R.G.S., London.

The Right Hon. the Lord Kelvin, M.A., LL.D., D.C.L., F.R.S., F.R.S.E., University of Glasgow.

Prince Kropotkin, South Acton, London.

G. W. Lamplugh, F.G.S., Geological Survey Office, London Eng.

The Right Hon. the Lord Lister, D.C.L., Pres. R.S., etc., London, Eng.

Professor Oliver J. Lodge, D.Sc., LL.D., F.G.S., University College, Liverpool.

Hugh Robert Mill, D.Sc., F.R.S.E., London, Eng.
Professor Henry A. Miers, F.R.S., F.G.S., Magdalen College, Oxford.

Professor John Milne, F.R.S., F.G.S., Isle of Wight.
Robert Munro, M.A., M.D., Edinburgh.

L. C. Miall, F.R.S., F.L.S., F.G.S., Yorkshire College, Leeds.

Professor Raphael Meldola, F.R.S., F.R.A.S., Finsbury Technical College, London.

Professor Meslans, University of Nancy, France.
Dr. Donald Macalister, M.A., M.D., Cambridge.

John L. Myres, M.A., F.S.A., Oxford.
Professor Edward B. Poulton, F.R.S., F.L.S., University of Oxford.

W. H. Preece, C.B., F.R.S., M.Inst.C.E., Wimbledon Common, Surrey.

Professor W. C. Roberts-Austen, C.B., Royal Mint London.

E. G. Ravenstein, F.R.G.S., F.S.S., London.
Wm. Ramsay, Ph.D., F.R.S., F.C.S., University College, London.

Arthur W. Rucker, M.A., D.Sc., F.R.S., Professor of Physics in the Royal College of Science, London.

Robert Saundby, M.D., F.R.S.P., Birmingham.
A. C. Seward, M.A., F.G.S., Cambridge, Eng.

Professor C. S. Sherrington, M.D., F.R.S., University College, Liverpool.

Sir William Turner, M.B., LL.D., D.C.L., F.R.S., University of Edinburgh.

Professor W. H. Thompson, M.D., Queen's College, Belfast.

Professor William Cawthorne Unwin, F.R.S., M.Inst.C.E., City and Guilds of London Inst.

Professor F. E. Weiss, B.Sc., F.L.S., Owens College, Manchester.

Professor H. Marshall Ward, D.Sc., F.R.S., F.L.S., Cambridge, University.

Professor W. G. Adams, M.A., F.R.S., F.G.S., King's College, London.

Professor Henrici, Ph.D., F.R.S., City and Guilds of London Institute.

Professor Major P. A. McMahon, R.A., F.R.S., Artillery College, Woolwich.

H. W. Seton-Karr, Esq., Wimbledon, Surrey.
Professor John Perry, D.Sc., F.R.S., London, Eng.

Walter Garstang, M.A., F.Z.S., Marine Biological Laboratory, Plymouth.

The Rt. Hon. the Earl of Berkeley, Abingdon.
Professor E. M. Crookshank, King's College, London.

G. Griffith, M.A. (Asst.Gen.Sec.), Harrow.
Professor H. McLeod, F.R.S., F.C.S., Royal Indian Civil Engineering College.

Professor C. Lloyd Morgan, F.G.S., Principal, University College, Bristol.

Professor S. P. Thompson, B.A., F.R.S., D.Sc., F.R.A.S., City and Guilds of London Technical College.

Dr. A. W. Waller, F.R.S., London, Eng.
W. T. Blanford, LL.D., F.R.S., F.G.S., London, Eng.

F. C. Selous, Esq., Wargrove, Bucks.
Sir Malcolm Fraser, General Agent for Western Australia.

Dr. D. Noel Paton, Edinburgh.
John A. Campbell, M.D., F.R.S., Carlisle, Eng.

Sir George S. Robertson, K.C.S.I., London, Eng.

Professor Anderson Stuart, University of Sydney, New South Wales.

Major-General Webber, C.B., R.E., M.Inst.C.E.

The following men of science from the Continent are to be present:

Professor Dr. Anton Dohrn, Zoological Station, Naples.

Professor Yves Delage, University of Paris.
Gustave Gilson, University of Louvain, Belgium.

A. Gobert, Brussels.
Professor Dr. Albert Ladenburg, Breslau.

Professor Meslans, University of Nancy, France.
Professor P. Magnus, University of Berlin.

Dr. Ph. Pauli, Frankfurt-am-Main.
Dr. van Rijkevorsel, Netherlands.

Professor C. Runge, Hannover.
Professor Charles Richet, Paris.

Professor Bohoslav Branner, University of Prag.
Professor Braun, University of Strassburg.

Professor Pittica, University of Marburg, Germany.
Professor K. Hürthle, University of Breslau.

Professor Penck, University of Vienna.

A. B. MACALLUM.

DE VOLSON WOOD.

PROFESSOR DE VOLSON WOOD, whose death was recently noticed in this JOURNAL, was a man of unusual attainments and was for nearly half a century identified with the promotion of that systematic technological education which has come to play so important a rôle in the civilization of the present day. He was born in 1832, and passed the years of his youth on the farm of his father near Smyrna, N. Y. He early displayed the capacities of a successful student and teacher of mathematics. The neighbors used to say that "the stones on Mr. Wood's farm are covered with figures which his son De Volson had used in the solution of problems;" and he began teaching school at the age of 17. After some preliminary studies in a private academy and at Cazenovia Seminary, he went to Albany State Normal School in 1852 and was graduated from that Institution at the end of the following year. During 1853-4 he was principal of the public school of Napanoch, N. Y.; and during 1854-5 he served the Albany Normal School as assistant professor of mathematics. He then

went to the Rensselaer Polytechnic Institute of Troy, N. Y., where, after two years' work as student and instructor, he was graduated with the degree of civil engineer. Immediately thereafter he became connected with Michigan University, in which he served as assistant professor of civil engineering from 1857 to 1859, as professor of physics and engineering from 1859 to 1860 and as professor of civil engineering from 1860 to 1872. At the end of the latter academic year he resigned his professorship in Michigan University to accept the professorship of mathematics and mechanics in Stevens Institute of Technology, which had been founded the same year. He remained with this institution until his death, holding the professorship of mathematics and mechanics until 1885, and from that year on the professorship of mechanical engineering.

It is an interesting circumstance, which in some measure undoubtedly determined Professor Wood's career, that he went to Michigan University shortly after President Henry Philip Tappan began his remarkable educational work in that institution. Tappan, considering the time in question, was a man of very broad and liberal views concerning educational affairs, and was one of the first to introduce in this country the German ideas of the functions and administration of a university. He was also one of the first of our educators to recognize the value of technological studies, and under his guidance there was established in Michigan University as early as 1855 a four years' course in engineering, to the conduct of which Professor Wood was called two years later. Two other brilliant men of the same institution into whose association Professor Wood was thrown at this time were the distinguished astronomers Francis Brünnow and James C. Watson. A more stimulating intellectual environment than that furnished by these three men could

not have been found in this country at that time.

From the time he went to Michigan University, in 1857, to the end of the present academic year Professor Wood was actively engaged in the work of instruction, rarely missing a day from his class-room in forty-one years. During the earlier part, especially, of this long interval, before the differentiation of studies now common had been attained, he gave instruction in a variety of subjects, embracing in fact nearly all those of the mathematico-physical sciences in the engineering curriculum. He was thus brought into intimate contact, and in many cases into prolonged association, with a large body of students who have borne abundant testimony to the exceptional value of his instruction and influence by the range and efficiency of the work they have accomplished. The peculiar merit of his teaching lay in his capacity to make men think laboriously and enthusiastically with their own heads. He was usually able to get students to devote willingly to his subjects three to five times as much labor as they would give to the subjects of other instructors. Being also himself a man of untiring industry, full of suggestions and enquiries, and animated always by a robust and transparent love of the truth, only the dullest students could fail to make creditable progress under his guidance. This genius for industry and this capacity for self-help are the elements of character he succeeded in planting firmly in the long list of engineers who had the good fortune to come under his instruction.

Professor Wood was a frequent contributor to scientific periodicals, particularly those devoted to mathematics and engineering. He was also the author of several text-books widely used in schools of engineering. In this work, as in teaching, his activity was indefatigable to the last, a revised and enlarged edition of his important

work on water motors having been brought out shortly before his death.

In appearance Professor Wood was a striking figure. His large, erect frame and his energetic manner at once commanded attention and respect. Socially he was a most genial and kindly man, full of patience and encouragement, especially for young men. He was of a somewhat retiring and domestic disposition, however, and mingled less with men of the world than might have been expected. Though honored by election to office in the scientific societies to which he belonged, he never sought personal advancement. He was content with his chosen work in the class-room, and the remarkable success he attained in that work amply justifies the singular fidelity with which he devoted his life to it.

R. S. W.

CURRENT NOTES ON PHYSIOGRAPHY.

THE LABRADOR PENINSULA.

MUCH interesting information about Labrador is to be found in an article by Low in the Annual Report of the Geological Survey of Canada for 1895 (Ottawa, 1897). The fiords of the Atlantic coast are described as valleys of denudation of very ancient origin, eroded when the elevation of the peninsula was greater than now. "Their remote antiquity is established by the deposition in their lower levels of undisturbed sandstones of Cambrian age." A similar explanation is given to the greater river valleys. The 'banks' for some fifteen miles off the coast are shallower than many of the fiords; they are explained as a terminal moraine, somewhat flattened out by floating ice and currents. At least a fourth of the plateau area is occupied by lakes of small depth confined in shallow valleys by barriers of drift. Some of the larger and deeper lakes occupy ancient basins, floored with Cambrian strata. There is a lakeless plain of marine sands and

clays carved by deep stream channels, extending inland for a hundred miles eastward from James bay. Much is told about Hamilton river, with its Grand Falls, and Bowdoin* Cañon below them, from which a clear picture of the plateau region may be gained. Erosion by ice is given a small measure; its chief result being to rub down hills and fill neighboring depressions, thus decreasing local relief. "There is no evidence to show that the glacier ever hollowed or scooped out deep depressions, as has been often stated to have occurred elsewhere." The till is frequently arranged in long low ridges, like drumlins, with nearly driftless tracts between them. Eskers are greatly developed, one having a length of nearly a hundred miles. They are ascribed to streams flowing on or below the ice when the glacial sheet had become practically stagnant.

It is difficult to reconcile the statements noted above as to the age of the fiords, the greater valleys and the deeper lakes, with the rates of denudation in resistant rocks elsewhere, unless it be supposed that for most of geological time the Labrador plateau has been covered by an inert ice sheet, protective of very ancient forms rather than productive of new forms; or unless it be supposed that the depressions were long ago made and filled and rather lately re-excavated. In any case, it is hardly possible that "the process of formation of these valleys has continued slowly from [Cambrian time] to the present day by the agency of falling water and of frost." Does the earth's surface exhibit any rocks resistant enough to retain significant slopes after so long an attack of the destructive subaërial forces?

THE CHICAGO AREA.

LEVERETT describes the Pleistocene features and deposits of the Chicago area

*Bowdoin is unfortunately misspelled *Bodwain* in the report and on the accompanying map of Labrador.

(Bull. II., Geol. and Nat. Hist. Survey, Chicago Acad. Sciences, May, 1897), including the Valparaiso moraine, the channel cut by the former outlet of Lake Michigan through the moraine and down the Illinois river valley, and the beaches of the former lake. The moraine is concentric with the present lake shore; it is a hilly belt, about ten miles wide and a hundred or more feet higher at the 'crest' than at the borders; its mounds frequently enclose hollows and lakelets. The channel cut by the former lake outlet follows a drift-clogged valley of preglacial origin below Hennepin (where the Illinois river turns from west to south), but is of glacial or post-glacial origin above that point. It is from one to five miles wide, and from 20 to 70 feet deep; its marginal bluffs are steep, like a river bank, throughout the entire length of 300 miles, as if the lake outflow had great volume, filling the channel from bluff to bluff. Three beaches are described, marking the lake shore at the time of the westward outflow. It should here be remembered that the slight difference between the level of the old outlet and of the present lake is not due simply to a slight withdrawal of the waters, but is due to a strong rise of the waters after a strong fall, as has been well shown by several students of the glacial history of the Great Lakes; the fall resulting from the adoption of eastern outlets, and the rise resulting from an elevation of the land in the northeast. So close a return to the Illinois outlet is portentous of the future.

STUDIES IN INDIANA GEOGRAPHY.

SEVERAL papers on the geography of Indiana by various authors have been published in the *Inland Educator* during the past year, and some of them have been referred to in these notes. The whole series is now edited by C. R. Dryer, professor of geography in the Indiana State Normal

School, and published in book form (Inland Publishing Co., Terre Haute, Ind., 1897). 'First series' appears on the title page, as if more essays are to follow; and it is to be hoped that such is the case, for much educational good must result from the careful use of such material by teachers. The book is notable in being the first of a kind that should have great extension over the country, as an encouragement and assistance in the study of home geography. There is to-day no similar series of essays even for States as prosperous and as important as Ohio and Pennsylvania. Indeed, it is a difficult matter for the inquiring teacher to find available geographical literature for her work. Professors of geography in other normal schools might well follow the example set by Dryer.

W. M. DAVIS.

HARVARD UNIVERSITY.

CURRENT NOTES ON ANTHROPOLOGY.

ANTIQUITY OF MAN IN SWITZERLAND.

THE thirty-fifth volume of the *Memoirs of the Société Helvétique des Sciences Naturelles* is taken up with a thorough analysis of cave exploration near the Rhine, by Dr. Jacob Nuesch and his collaborators. The conclusions he reaches are the more noteworthy because they were obtained after the most exhaustive investigations and comparisons of the fauna, flora and human remains exhumed from the cave-floors. They may be briefly summed up as follows:

The oldest faunas found were sub-arctic and post-glacial. Man was contemporaneous with these, and at that time his industries were distinctly palæolithic. This period lasted about 8,000 years. A long period then elapsed, 8,000 to 12,000 years, during which the fauna changed to modern types, but man seems to have been absent. The neolithic and lake-dwelling period then

began and continued about 4,000 years, closing with the introduction of bronze about 4,000 years ago.

This makes about 28,000 years since man first appeared on Swiss soil; but it must be borne in mind that he may have flourished in milder parts of the continent for indefinite ages before that. The vast Alpine glaciers rendered the climate of Switzerland uninviting long after the continental glacial period had ceased.

MOKI CEREMONIALS.

AN instructive article for the student of primitive religions is that by Dr. J. Walter Fewkes on 'The Group of Tusayan Ceremonials called *Kateinas*.' (15th Rep. Bureau of Ethnology.) It is a faithful narration of the strange religious performances, amply illustrated, and the native terms preserved wherever possible.

The word *Kateina* is a vague term for spiritual beings of an inferior class to the highest deities of the tribe, but who are credited with much power over the welfare of the community. They may include the ancestral souls, but are not exclusively these. The ceremonies in their honor are frequent, and distributed throughout the year in a ritual calendar devised by the priestly class. Both men and women participate in them, and they have the character of a sacred drama, as have most primitive rituals. Masks, costumes and traditional songs and chants are prominent features.

Dr. Fewkes finds noticeable resemblances between these ceremonials and those of other Pueblos, but also marked differences. He is impressed with their analogies to those of the ancient Aztecs, and it is likely that throughout America numerous counterparts could be discovered.

D. G. BRINTON.

UNIVERSITY OF PENNSYLVANIA.

NOTES ON INORGANIC CHEMISTRY.

LÉON FRANCK details in the Bulletin of the French Chemical Society some interesting experiments on the formation of metallic sulfids by mechanical action. When a mixture of fine aluminum powder and flowers of sulfur is rubbed between two sheets of paper, hydrogen sulfid is evolved, owing to the formation of aluminum sulfid and its subsequent decomposition. The same reaction takes place between magnesium powder and flowers of sulfur. If an aluminum plate be rubbed with flowers of sulfur, or even with vulcanized rubber, the odor of hydrogen sulfid is distinctly perceptible. With those metals whose sulfids are not decomposed in the air the reaction is different. When a plate of silver is rubbed with flowers of sulfur it gradually darkens, owing to the formation of silver sulfid, and if the action is continued, little prominences of silver sulfid are formed, which can be removed by a knife. Copper and lead give the same reaction as silver.

This reaction corresponds to the well known darkening of silver coins when carried in the pocket with sulfur matches. In the case of blackening of silver spoons by eggs the reaction is somewhat different, as the sulfur is in combination and in solution. The layer of sulfid must in this case be exceedingly thin, for silver spoons which have been used sometimes for more than a generation have been cleaned again and again, perhaps weekly, each time the layer of sulfid being rubbed off, and yet the spoons show apparently little diminution of weight.

In the *Comptes Rendus*, Léon Léal describes the coloring of glass by the direct penetration of metals or metallic salts, analogous to the cementation process of steel making. If glass is covered with a silver salt, even in small quantity and heated to 500°-550°, on cooling it shows a

yellow to orange-red color, according to the length of time of heating. The depth of penetration of the color depends upon the duration of the reaction. Such glass is yellow by transmitted light, but by reflected light shows a yellowish-green to violet-blue fluorescence. By using a silver photographic plate on red glass colored with copper, it is possible to obtain a picture, visible by reflected light, but not by transmitted light, since the yellow of the picture is obscured by the red glass. Gold, copper and iron give results similar to silver; indeed, all metals experimented with, except manganese, were absorbed by the glass imparting to it color.

A CONTRIBUTION to the effect of light upon the union of hydrogen and chlorin is made by A. Gautier and H. Hélier in the *Comptes Rendus*. A mixture of carefully purified chlorin and hydrogen was kept in sealed tubes in absolute darkness for over fifteen months. No trace of hydrochloric acid was found, and the result was the same, whether the mixture was dry or moist. Similar experiments were tried, but the mixtures were exposed to the light of a candle, four meters away from the tube, and again one meter away. At the end of ten days it was found there had been no hydrochloric acid formed, showing that sunlight, or some source of light containing the more refrangible rays of the spectrum, is necessary for the union of hydrogen and chlorin at ordinary temperatures.

J. L. H.

SCIENTIFIC NOTES AND NEWS.

AN INTERNATIONAL ASSOCIATION.

THE meeting of the British Association in Canada in 1884 was thought a favorable opportunity for the proposal of an International Scientific Association, and the plan was editorially commended in this JOURNAL and supported by Professors Newcomb, Hunt, Minot and other American men of science. At that time Mrs. Elizabeth Thompson gave a fund to be

administered by the Association when organized. The second meeting of the British Association in America and the plans for an exchange of courtesies between it and the American Association and between the British and French Associations in 1899, together with the development of international congresses for the separate sciences, seemed to make it desirable again to call attention to the importance of an international association for the advancement of science, and this was done in an article published in the issue of this JOURNAL for October 9, 1896.

The plan was approved in editorial articles in the *Scientific American* and *Appleton's Popular Science Monthly* and was quoted and discussed in foreign scientific journals. For reasons which we need not repeat, the advantages of an international conference seem to outweigh the difficulties, and we should like to see steps taken at the meetings of the American and British Associations for the organization of a congress to meet in 1900. Should it, however, be thought that the time has not yet come, then we should be glad to see the National Associations undertake in alternation to give their meetings an international character. This will to a certain extent be accomplished this year by the British Association. Arrangements should be made next week to secure the representation of foreign associations and societies by delegates at the next meeting of the American Association on the occasion of its fiftieth anniversary.

THE NEW TARIFF LAW.

THE tariff bill, now printed, fortunately contains none of the provisions inimical to science and education, against which we protested when the bill was first presented to the House of Representatives. The present bill does not materially alter the regulations in force during the last four years. The sections of the free list which concern apparatus, books, etc., read as follows:

Philosophical and scientific apparatus, utensils, instruments and preparations, including bottles and boxes containing the same, specially imported in good faith for the use or by the order of any society or institution, incorporated or established solely for religious, philosophical, educational, scientific or lit-

erary purposes, or for the encouragement of the fine arts, or for the use or by order of any college, academy, school or seminary of learning in the United States, or any State or public library, and not for sale, subject to such regulations as the Secretary of the Treasury shall prescribe.

Books, maps, music, engravings, photographs, etchings, bound or unbound, and charts, which shall have been printed more than twenty years at the date of importation, and all hydrographic charts and scientific books and periodicals devoted to original scientific research, and publications issued for their subscribers or exchanges by scientific and literary associations or academies, or publications of individuals for gratuitous private circulation, and public documents issued by foreign governments.

Books and pamphlets printed exclusively in languages other than English; also books and music, in raised print, used exclusively by the blind.

Books, maps, music, photographs, etchings, lithographic prints, and charts, specially imported, not more than two copies in any one invoice, in good faith, for the use or by order of any society or institution incorporated or established solely for religious, philosophical, educational, scientific, or literary purposes, or for the encouragement of the fine arts, or for the use or by order of any college, academy, school, or seminary of learning in the United States, or any State or public library, and not for sale, subject to such regulations as the Secretary of the Treasury shall prescribe.

It may also be noted that the free list includes specimens of natural history, when imported for scientific public collections and not for sale, and wild animals imported for zoological gardens. Personal effects of travellers purchased abroad are limited to the value of \$100, but professional books, implements, instruments and tools of trade, occupation or employment, in the actual possession at the time of persons arriving in the United States are free of duty.

THE GOLD RESOURCES OF THE YUKON REGION.

THOSE interested in the gold resources of the Yukon region in Alaska should secure, from the Geological Survey, the report of the expedition made under the direction of Mr. J. E. Spurr last summer, a brief account of which was published in this JOURNAL on November 27, 1896. The party crossed the Chilkoot Pass, about the middle of June, to the headquarters of the Yukon, and proceeded down the river

to the chief gold-bearing localities. The principal producing districts, those of Forty-Mile Creek and Birch Creek, were thoroughly explored, as well as other less important localities. The party then continued down the Yukon, examining the younger sedimentaries which overlie the gold-bearing formation, as far as Nulato. One of the principal results of the expedition was the recognition of the gold-bearing rocks from which the gold in the river gravels is derived. These gold-bearing rocks constitute a distinct broad belt running northwest into Alaska from British territory. They are in their lower portions schists and gneisses, with intrusive rocks, and in their upper portion somewhat altered sedimentaries. They are all older than Carboniferous, for the Carboniferous and younger rocks overlie them on both sides of the gold-bearing belt. In this belt the gold occurs partly in quartz veins, partly in deposits formed along shear-zones; in both occurrences it is contained in pyrite, and becomes free on weathering. The quartz veins are distinctly older than the shear-zone deposits, and were formed before the alteration of the enclosing rock to a schist; they have, therefore, partaken of this shearing, and have been broken and sheared so that they are typically non-persistent. The deposits along shear-zones are, however, of later date than the shearing, and can be continuously followed. The younger beds which overlie the gold-bearing belt consist in part of conglomerates, and some of these conglomerates are fossil placers, which give promise of being productive.

GENERAL.

THE French Association for the Advancement of Science is holding its annual meeting simultaneously with that of the American Association. The meeting is at Saint Étienne, under the presidency of M. Marey, the eminent physiologist.

At a meeting summoned by the Lord Provost of Glasgow, and attended by representatives from the magistrates, the University, St. Mungo's College, the Philosophical and other scientific societies, it was unanimously decided to invite the British Association to meet in Glasgow in the autumn of 1901.

THE German Botanical Society will this year hold its annual meeting at Brunswick, beginning September 21st, in conjunction with the sixty-ninth meeting of the German Society of Men of Science and Physicians.

WE have published programs of the meeting of the British Medical Association at Montreal, beginning August 31st. The Sections of the Association devoted to scientific subjects will undoubtedly attract to Montreal many of the British and American men of science attending the Toronto meeting of the British Association. The annual business meeting of the Medical Association was held in London on July 27th and 28th, and the reports of the Council and of the committees have been published in the *British Medical Journal*, the official organ of the Association, to which journal its great success is in large measure due. The membership of the Association is now 16,955, and the revenue for the past year amounted to \$190,000.

WE are requested by the Secretary of the American Society of Naturalists to publish the following communication, read at the last meeting of the Society:

TORONTO, December 24, 1896.

To the Secretary of the American Society of Naturalists.

DEAR SIR: The Local Executive Committee of British Association respectfully calls attention to the fact that the next meeting of the Association will be held in Toronto, August 18-25, and the members of the American Society of Naturalists are invited to become members of the Association for the occasion.

A large number of representative British scientific men have thus early promised to attend and the Local Committee are endeavoring to secure the attendance also of large numbers of distinguished Continental (European) scientific men at the meeting.

Permit me to assure the members of the American Society of Naturalists that everything will be done to make their visit to Toronto an extremely pleasant one.

Yours sincerely,

A. B. MACALLUM,

President of the Local Executive Committee.

THE daughters of Joseph Henry, the first Secretary of the Smithsonian Institution, have presented to the Institution for the National Museum an interesting collection of electrical

models devised by Henry, and of decorations, etc., conferred upon him.

THE late Sir Augustus Wollaston Franks, formerly keeper of British and mediæval antiquities of the British Museum, has bequeathed to the Museum his valuable collection of works of art, ornaments and curiosities.

IT is proposed to collect a fund for a memorial at Glasgow to John and William Hunter, the great physiologists. An executive committee for this purpose was appointed at a public meeting recently convened at Glasgow. The movement originated with the late Dr. Mather, and Mrs. Mather, who was present at the meeting, stated that she had a sum of £850 with which to head the subscription list.

PROFESSOR EDGAR MCCLURE, of the Oregon State University, fell 300 feet over a precipice on the Muir Glacier while descending Mount Rainier on July 27th and was killed. Two other members of the Mazama Mountain Climbing Club, Mr. George Rogers and Mr. H. Ainslee, of Portland, Ore., fell into a crevasse on Mt. Rainier forty feet deep, and the former may not recover from his injuries.

SIR JOHN BUCKNELL, F. R. S., the author of important contributions to neurology and insanity, formerly editor of the *Journal of Mental Science* and one of the editors of *Brain* and of the *British Medical Journal*, died at Bournemouth on July 20th, aged 79 years.

MR. A. J. MUNDELLA, the English statesman, who as Vice President of the Council on Education and President of the Board of Trade took an active interest in science and education, died on July 21st, aged 72 years. He was a fellow of the Royal Society and of the Royal Statistical Society.

WE regret also to announce the deaths of the following men of science: Professor Arminio Nobile, professor of geodesy in the University of Rome; Professor Oscar Boer, of Berlin, known for his work on infectious diseases, and Professor Johann Ritter von Leich, formerly dean of the medical faculty of the University of Vienna, at the age of eighty-four.

DR. RADCLIFFE's trustees have decided to appoint to the post of Radcliffe Observer at Oxford, vacant by the death of the late Mr. E.

J. Stone, Dr. Arthur A. Rambaut, of Dunsink Observatory, Dublin. Dr. Rambaut is Andrews professor of astronomy in the University of Dublin and Royal Astronomer of Ireland.

DR. BRUNO HOFER, docent in zoology at the University of Munich, has been appointed director of the recently established institute for the study of diseases of fishes.

AT a recent meeting of the Council of the British Institute of Preventive Medicine, Dr. Allan Macfadyen was appointed Director of the Institute.

M. GAYON has been elected a member of the Paris Academy of Sciences in the room of the late Professor Hellriegel.

THE official delegates to the recent International Library Conference were as follows: *France*, M. Omont; *Germany*, Dr. Milkau; *Italy*, Signor Biagi; *Sweden*, Dr. Lunstedt; *Hungary*, Dr. Erdelyi; *Japan*, Enjiro Yamazo; of the Anglo-Saxon race—*Great Britain*, Sir Horace Walpole, Mr. C. H. Tawney; *United States*, Dr. Justin Winsor, Mr. Melvil Dewey, Mr. Herbert Putnam; *Canada*, Mr. A. D. de Celles; *New South Wales and Victoria*, Mr. H. C. L. Anderson; *New Zealand*, Mr. W. P. Reeves; *Jamaica*, the Rev. Dr. Gillies.

THE chairmen of the committees of the House of Representatives having more or less connection with scientific subjects, appointed by the Speaker before the adjournment of the House, are as follows: Coinage, Weights and Measures, Mr. Stone, of Pennsylvania; Agriculture, Mr. Wadsworth, of New York; Public Lands, Mr. Lacey, of Iowa; Railways and Canals, Mr. Chickering, of New York; Manufacturers, Mr. Faris, of Indiana; Mines, Mr. Grosvenor, of Ohio; Education, Mr. Growe, of Pennsylvania; Patents, Mr. Hicks, of Pennsylvania.

PROFESSOR CHAS. D. WALCOTT, Director of the U. S. Geological Survey, has gone west to inspect and direct the field work of his bureau, more especially the survey and examination of the forest reserves, for which Congress, at its last session, made a special appropriation of \$150,000. Mr. Walcott expects to be absent until October. In his absence, Colonel Rizer, the Chief Clerk, is acting as Director.

MR. GEO. H. ELDRIDGE, of the U. S. Geological Survey, has gone to Utah, at the instance of the Secretary of the Interior, to re-examine, in greater detail than was possible at the time of his reconnaissance a year ago, the deposits of Gilsonite and allied Hydrocarbons within the Uncompahgre and Ute Indian reservations.

THE daily papers report that Professor William Libbey, on July 23d, succeeded in scaling the 'Mesa Encantada,' near the Indian village of Acoma, New Mexico. By means of a cannon and rocket apparatus similar to that used by life-savers, a cord was shot over the tableland, and the ropes required in making the ascent were pulled up. All that was found on top which indicated that the tableland might have been inhabited was a pile of rocks which looked as if it had been erected by man. Professor Libbey is said to be convinced that the legends which made the place the site of an ancient village are unfounded.

THE London correspondent of the *Evening Post* cables that the Egyptian government is increasing the staff engaged on the geological survey of upper Egypt for the coming winter so as to keep five distinct parties at work. The survey may possibly develop in time into a scientific bureau of Egyptian natural history. A vote of 100,000 francs has been passed by the French Chamber of Deputies for explorations in Persia this autumn. The convention signed by the Shah gives a monopoly of researches throughout Persia to the French, the conditions being that one-half of the objects found shall pass to the state. M. De Morgan, well known through his investigations in Egypt, will conduct the operations.

MR. GEORGE MURRAY and Mr. V. A. Blackman have gone to the West Indies for the purpose of studying the Plant-Plankton of the Atlantic ocean.

ADVICES from Sydney state that the search party under the leadership of Mr. L. A. Wells has found the bodies of Charles Wells and George L. Jones, who, it will be remembered, were lost nearly two years ago from the main body of the Calvert expedition, engaged in the exploration of West Australia.

GREAT BRITAIN has accepted the proposal of the United States for an international conference on the question of pelagic sealing in the Bering Sea, to be held in Washington during the coming autumn.

THE fourth congress for the study of tuberculosis will be held at Paris during the last week of July, 1898, under the presidency of M. Nocard. The following four questions are proposed for discussion: Sanitaria for consumptives, serums and toxins, the X-rays in diagnosis and treatment, and tuberculosis in the lower animals.

IN connection with the Brussels Exposition, there will be held, from August 9th to 14th, a Congress of Hygiene and Medical Climatology of Belgium and the Congo.

AT the last monthly general meeting of the London Zoological Society it was reported that the additions to the Society's menagerie during the month of June had amounted to 178. Special attention was called to two fine adult King Penguins (*Aptenodytes pennanti*) purchased on June 23d, and a young female Orang-outang (*Simia solyrua*), brought home from Sumatra, and presented by Dr. H. Dohrn, on June 30th.

MRS. VIRGINIA MONROE has given \$30,000 to the Pequot Library Association, the building of which was the gift of the late Albert B. Monroe.

MR. ANDREW CARNEGIE has offered the town of Stirling, Scotland, the sum of £6,000 for a public library building.

THE issue of *Nature* for July 15th contains an appreciative review, by Professor A. G. Greenhill, of the text-book of higher mathematics edited by Professors Merriman and Woodward: "This is a style of mathematical treatise to which we are not accustomed in this country, from the luxury of the print and size of page, as well as for the refreshing novelty and interest of the contents. Till recently it was thought that the study of mathematics was not likely to flourish in America as *trop vieux jeu* by the side of the new physical and biological sciences. To-day, however, it is the American student who is the most enthusiastic follower of recent mathematical development, while we in this country are being left far behind. ***** The account, given by the editors in the preface,

of the work expected of the average American student, shows that the standard of requirement is much higher than in this country and not hampered by traditional prejudice."

THE anatomical departments of the *Journal of Anatomy and Physiology* will hereafter be edited by Professors Turner, MacAlister, Cunningham and Thane. Professor M'Kendrick will continue to edit the physiological department.

UNIVERSITY AND EDUCATIONAL NEWS.

THE University of London Bill has been introduced into the House of Lords by the Duke of Devonshire and has been read for the second time.

THE United States Circuit Court at Baltimore, on July 29th, handed down a decision that the Johns Hopkins University and other holders of first preferred 6 per cent. stock of the Baltimore and Ohio Railroad are not preferred creditors. The trustees of the University hold nearly \$2,000,000 of the preferred stock, bequeathed by the founder of the University, the late Johns Hopkins, and this decision, if upheld by the higher Courts, will seriously and permanently curtail the income of the University.

As was stated in this JOURNAL last autumn, it is proposed to draw up plans for buildings such as the University of California hopes ultimately to erect. We fear, however, that the sum of \$4,000,000, which the daily papers report to have been subscribed for the erection of these buildings, has not as yet been secured.

It is reported in the daily paper that Dr. E. Benjamin Andrews, who resigned the presidency of Brown University for reasons given in our last issue, has accepted the presidency of a new 'university' to be founded by Mr. John Brisben Walker, proprietor and editor of the *Cosmopolitan Magazine*, and to be known as the 'Cosmopolitan University.' It is to be modelled after the Chautauqua School and to be conducted by correspondence.

PROFESSOR HENRY KRAEMER, of the Northwestern University, has been called to the chair of botany and microscopy in the Philadelphia College of Pharmacy, and Dr. Albert

Schneider, Ph.D. (Columbia), has been called to the chair in Northwestern University vacant through the resignation of Professor Kraemer.

DR. L. SCHLESINGER, of Bonn, has been appointed full professor of mathematics at Klausenburg; Dr. Detmer, associate professor of botany in the University of Jena, has been promoted to a full professorship; Dr. Lassar Cohn, professor of chemistry in the University at Königsberg, has been elected director of the Liebig Akademie of Munich; Dr. A. O. Kihlman has been appointed associate professor of botany at Helsingfors, and Dr. G. J. Ptaschicky, professor of zoology in St. Petersburg; Dr. F. v. Luschka, docent in the University of Berlin, has been promoted to a professorship of anthropology; Dr. Seelhorst, director of the Agricultural Experiment Station at Göttingen has accepted a professorship in the Agricultural College at Hohenheim.

DISCUSSION AND CORRESPONDENCE.

COLOR STANDARDS.

It is a matter for congratulation that the subject of color standards and definitions has been brought before the public for discussion in SCIENCE*. Education in any branch of knowledge becomes simple and successful in proportion as its terminology is definite and intelligible. It would be quite interesting to set forth the plans that have been offered for obtaining color standards; one proposes to take an orange as the type of that color, and in like manner to let a lemon, an olive, etc., be the ultimate definition of those hues. One has even suggested a collection of wines of various colors as standards, and the matching of other colors by mixing the wines, an operation as dangerous as it is unscientific.

In the search for standards we must first be able to define completely a colored surface; not by saying that it resembles or differs to a certain extent from some other arbitrary surface, but it must be defined in terms of certain invariable and readily reproducible standards.

To describe completely a surface we must give value to four factors which go to affect the impression which it produces upon the normal

observer: First, the predominating wave-length or wave-lengths of the light coming from it; second, its total luminosity, as compared with some standard; third, its saturation, or the ratio of the colored light to the total luminosity; fourth, its texture.

The matter of texture may be eliminated by placing the surface far enough from the eye, or, better, by rotating it so rapidly that the eye cannot distinguish the texture; consequently a standard of texture is unnecessary. A standard of total luminosity is easily obtained by holding a cold surface over burning magnesium or zinc; the coating of oxide thus produced has been adopted as 'white' by Rood, Mayer and others. In other words, the luminosity of such a surface is taken as 100%. A box about five feet in length and one in cross-section, lined with black velvet and provided with an opening about four inches in diameter in one end, when so mounted that light cannot shine directly into the opening, will furnish an admirable standard black, or 0% luminosity. Between these two extremes fall all surfaces not incandescent. White cardboard and lamp-black form very convenient 'practical units,' and their relation to the standards can at any time be easily and accurately determined. The question of saturation, or the ratio of the energy of the predominating characteristic wave-lengths to the total visible energy, is serious. In fact, for the present we must be satisfied to agree upon some temporary standards which may ultimately be absolutely determined.

As to the predominating or characteristic wave-length or wave-lengths we might, of course, refer everything to the spectrum and define by it directly, but it would be a very elaborate and inconvenient method. It is, however, customary to adopt a few typical wave-lengths and define by combinations of these. Theoretically three such colors are sufficient, but practical convenience makes it desirable to have five or six. Then a mixture of these, with the addition of black and white when necessary, enable the observer to match any color, shade, tint or hue.

What shall govern the choice of the five or six working standards? Of course, we expect red, green and blue; probably yellow, and pos-

* See article in SCIENCE, July 16, p. 89.

sibly orange and violet. At first the scientific method would seem to be to choose from the spectrum itself and locate those colors ideally, but we wish concrete surfaces of paper or similar material for our working standards, and if we choose our colors thus can we match them in practice? Chromolithography can do wonders and can nearly match a spectrum color. The objection, however, to such working standards is that each lithographer, and indeed the same one at different times, will succeed to different degrees, so that a slight variation in color, luminosity and saturation is inevitable.

Moreover, practically all the lithographic inks used in such work will fade, and fade surely and badly, a fatal objection to their use as standards. Another way to choose the working colors is to have in mind the pigment to be used in representing the color, as well as the particular wave-length desired.

It was the apparent advantages of the latter method, as well as the advice of good authorities, which led us to follow it in the choice of our working standards when we were asked to prepare the material in the 'Standard Dictionary.' In our choice we were influenced by the following considerations: Emerald green (Paris green) is of the desirable color, is very uniform and is easily obtained; similar advantages recommend artificial ultra-marine blue. For a red, evidently a vermilion should be taken, and in selecting 'English vermilion' we may have erred, but believe it the most uniform and best suited. Mineral orange seemed very nearly identical in different samples, and was adopted since its color was that desired. As to chrome yellow it may be very truly urged that there are great variations, but when the samples are chosen by wave-length the character of the yellow is identical. The lack of a good, permanent violet pigment, as well as the apparent lack of the necessity of having a violet standard induced us to omit it. These pigments can be obtained everywhere, and for most purposes true enough to wave-length. They fade but slightly, if at all, and when mixed with thick gum arabic solution and applied like an oil paint to completely cover the surface their total luminosity and saturation is always practically the same.

They thus furnish working standards which can be reproduced by anybody in any part of the world with great accuracy if necessary. Together with white cardboard and lamp black carried in shellac they enable an observer to produce practically any color, shade, hue or tint, by combining them as Maxwell disks.

Other pigments, other colors, may finally prove more worthy of general and final adoption, but it seems to us that the considerations which influenced us most seriously influence the final selection.

No doubt Mr. Pillsbury regretted that his system was not adopted for the 'Standard Dictionary', but that should not have induced him to insinuate that we copied his system, or to refer to a typographical error as 'an unintentional blunder.' We have no desire to belittle the work of Milton Bradley or Mr. Pillsbury, for they are doing much for the introduction of scientific methods into color study, but it did not seem best to us to attempt to define all colors, using only two colored discs at a time, and we do not believe that any lithographed surfaces should be adopted as ultimate standards, even though they may prove best adapted to educational purposes.

W. HALLOCK,
R. GORDON.

THE TERM 'INTERNAL SECRETIONS.'

TO THE EDITOR OF SCIENCE: At the beginning of his interesting paper on 'The Physiology of Internal Secretions,' SCIENCE, No. 132, Dr. Howell says: "We owe the term 'internal secretions' to Brown-Séquard, by whom it was first used in published communications dating from 1891." It may be worth while to note that Claude Bernard in his famous 'Rapport sur les progrès et la marche de la physiologie générale en France,' 1867, says, at page 73, "La cellule sécrétoire, au contraire, attire, crée et élabore en elle même le produit de sécrétion, qu'elle verse soit au dehors sur les surfaces muqueuses, soit directement dans la masse du sang. J'ai appelé *sécrétions externes* celles qui s'écoulent en dehors, et *sécrétions internes* celles qui sont versées dans le milieu organique intérieur."

C. B. DAVENPORT.

MUS. COMP. ZOO., July 26, 1897.

SCIENTIFIC LITERATURE.

Vorlesungen über die Elektromagnetische Theorie des Lichts, von H. VON HELMHOLTZ. Herausgegeben von ARTHUR KÖNIG und CARL RUNGE. Hamburg and Leipzig, Verlag von Leopold Voss. 1897.

Since the experiments of Hertz proved the existence of electro-magnetic waves propagated through dielectrics, the attention of an increasing number of physicists has been turned to the careful study of Maxwell's 'Electro-magnetic Theory of Light,' and the belief has become practically universal that this theory, in its general outlines at least, corresponds closely to physical facts. Several hundred important papers on matters more or less nearly related to the theory have been published during the last ten years, and the results of investigation have been made fairly accessible to students through the books of Boltzmann, Drude, Hertz, Poincaré, J. J. Thomson and others. When, however, a great university teacher, who has had much to do with the creating of a new branch of science, writes a systematic treatise on the subject for the use of his pupils, the event must always be of interest to the scientific world, and this is especially true when the subject is so important and in some respects still so abstruse as the Electro-magnetic Theory of Light is. The lectures, which are now published under the editorship of Professors König and Runge, were delivered substantially in their present form by Helmholtz in the Winter Semester of 1892-93. An accurate stenographic report of the words of the lecturer was made by Dr. Borchardt, and this report, with slight editorial changes, made in part by Helmholtz himself, and with some additions, made by his directions, to the chapters on Geometrical Optics, is reproduced in a beautifully printed royal octavo volume of about 370 pages.

The lectures begin with a short account of the Newtonian and the Huyghenian Theories of Light and of the objections to each of them. A discussion of the conditions which the propagation of plane longitudinal and transverse waves through elastic media presupposes, makes clear the necessity of ascribing to the ether the elastic properties of a solid, if it is to transmit transverse vibrations mechanically, and leads nat-

urally to a preliminary presentation of Maxwell's theory based on Faraday's conceptions of magnetic and dielectric polarizations. After this introduction, a long chapter is devoted to a very simple and clearly written but very complete discussion of electro-magnetic oscillations, intelligible to any person who already has a fair knowledge of the meaning of polarization and of the differences between 'real,' 'apparent' and 'induced' magnetic and electric densities. This discussion calls attention anew to the fact that the nomenclature and the notation of the subject are in a very unsatisfactory state. Helmholtz himself sometimes defined inductivity so as to make that of the ether 1 and sometimes so as to make it 4π , and the editors of these lectures were obliged to change the notation in some places so as to make the whole book consistent. The subject will be needlessly difficult for students so long as different writers give the name 'polarization,' without any modifying clause, to three very different quantities.

In transforming Maxwell's equations for electro-magnetic fields, Helmholtz treats the principles first elucidated in his own great paper on Vortex Motion, published in 1858, simply as analytical devices useful in integrating differential equations of a certain form. Neither here nor elsewhere in the book does the lecturer make any reference to his own contributions to the subject. In the third chapter the properties of spherical waves are studied in detail, and Huyghens's Principle is put into a very satisfactory shape by the help of an extended form of Green's Theorem in which the time and the space coordinates appear as independent variables. This makes it possible to treat Diffraction, Interference and Geometrical Optics in the next two chapters very much as they are treated in older books on the Undulatory Theory of Light.

The final chapter is devoted mainly to Polarization, Absorption and Dispersion, and is especially interesting since it gives the author's theory of Dispersion in its latest form. This theory assumes that every molecule of matter is made up of two ions, one charged positively and the other negatively. The amounts of these two charges in any molecule are very large and numerically equal, and each depends only upon

the valency of the ion in that molecule and not upon the chemical nature of the ion. Under the influence of electric force, the ions in any molecule may be made to take up a new position while their center of mass remains fixed. If the force varies periodically, a part of the energy of the field is used in keeping up the oscillations of the ions about this center of gravity in the face of heat losses. Helmholtz applies Hamilton's Principle to the equation of energy and arrives at results which correspond fairly well to observed facts.

The whole book is written in delightfully simple language and seems to be quite free from typographical errors. We merely note, in passing, that George Green held a fellowship in Cambridge from 1839 until his death in 1841, but never a professorship there. These lectures form one of a projected set of six volumes of Helmholtz's Vorlesungen über Theoretische Physik which will be extremely useful to students of physics all over the world.

HARVARD UNIVERSITY.

B. O. PEIRCE.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

GENERAL PROGRAM.

THE regular meeting of the Council will be at the Hotel Cadillac (hotel headquarters) at noon on August 7th.

On Monday, August 9th, at 9 a. m., the Council will meet in the Council Room, Central High School.

The first General Session of the Association will be held at 10 a. m., in the Auditorium of the Central High School. Owing to the death of Professor Edward D. Cope, the President of the Association, Professor Theodore Gill, of Washington, D. C., as Senior Vice-President, will call the meeting to order and introduce the President-elect, Professor Wolcott Gibbs, of Newport, R. I. Addresses of welcome will be made by his Honor Mayor William C. Maybury and Hon. Thomas W. Palmer, and President Gibbs will reply. Announcements by the General, Permanent and Local Secretaries will then be made.

The Addresses of the Vice-Presidents will be given in the afternoon as recorded below. In the evening Professor Theodore Gill, of Wash-

ington, D. C., will give a memorial address on the life and work of the late President, Professor Edward D. Cope. Following this address there will be a reception given by the citizens of Detroit.

On Tuesday, Wednesday, Thursday and Friday the regular meetings of the Council will be held at 9 a. m. and of the general session at 10 a. m., followed in the mornings and afternoons by the meetings of the sections.

On Friday morning officers will be elected and an agreement reached on the place of meeting for 1898, the fiftieth anniversary of the Association. The concluding exercises and adjournment of the sections of the Association and a social reunion and reception by the Ladies' Reception Committee will take place in the evening.

On Saturday there will be an excursion to Ste. Claire Flats.

It is expected that the members of the Association at Detroit will go in a body to Toronto to join in welcoming the members of the British Association to America. For this purpose special rates will probably be secured by steamer and train from Detroit to Toronto.

The programs of the sections are given below. These are as complete as possible up to the time of issue of this number of SCIENCE, but other papers will be presented at the meeting and entered on the daily programs.

SECTION A.—MATHEMATICS AND ASTRONOMY.

Address of the Vice-President: A Chapter in the History of Mathematics. By Professor W. W. Beman, University of Michigan, Ann Arbor, Mich.

1. A Problem in Substitution-groups. By Dr. G. A. Miller, Ann Arbor, Mich.

2. Continuous Groups of Spherical Transformations in Space. By Professor H. B. Newson, Lawrence, Kans.

3. The Treatment of Differential Equations by Approximate Methods. By Professor W. F. Durand, Ithaca, N. Y.

4. Commutative Matrices. By Professor J. B. Shaw, Jacksonville, Ill.

5. On the Theory of the Quadratic Equation. By Professor A. Macfarlane, Lehigh Univ., South Bethlehem, Pa.

6. A New Principle in solving certain Linear

Differential Equations that occur in Mathematical Physics. By Professor A. Macfarlane, Lehigh Univ., South Bethlehem, Pa.

7. Condition that the Line common to $n-1$ planes in an n -space may lie on a given Quadric Surface in the same space. By Dr. Virgil Snyder, Ithaca, N. Y.

8. The Psychology of the Personal Equation. By Professor T. H. Safford, Williamstown, Mass.

9. Compound Determinants. (Preliminary Communication.) By Professor W. H. Metzler, Syracuse, N. Y.

10. Waters within the Earth. By W. S. Auchincloss, C.E., Philadelphia, Pa.

11. On the Secular Motion of the Earth's Magnetic Axis. By Dr. L. A. Bauer, Univ. of Cincinnati, Cincinnati, O.

12. Simple Expressions for the Diurnal Range of the Magnetic Declination and of the Magnetic Inclination. By Dr. L. A. Bauer, Univ. of Cincinnati, Cincinnati, O.

13. The Theory of Perturbations and Lie's Theory of Contact-transformations. By Dr. E. O. Lovett, Baltimore, Md.

14. On Rational Right Triangles. No. I. By Dr. Artemas Martin, U. S. Coast Survey, Washington, D. C.

15. Some Results in Integration expressed by the Elliptic Integrals. By Professor James McMahon, Cornell Univ., Ithaca, N. Y.

16. Modification of the Eulerian Cycle due to Inequality of the Equatorial Moments of Inertia of the Earth. By Professor R. S. Woodward, Columbia Univ., New York.

17. Integration of the Equations of Rotation of a Non-rigid Mass for the case of Equal Principal Moments of Inertia. By Professor R. S. Woodward, Columbia Univ., New York.

18. General Theorems concerning a certain class of Functions deduced from the properties of the Newtonian Potential Function. By Dr. J. W. Glover, Ann Arbor, Mich.

19. The Importance of Adopting Standard Systems of Notation and Coordinates in Mathematics and Physics. By Professor Frank H. Bigelow, U. S. Weather Bureau, Washington, D. C.

20. A Remarkable Complete Quadrilateral among the Pascal Lines of an Inscribed Six-

point of a Conic. By Professor R. D. Bohannan, Columbus, Ohio.

JAMES MCMAHON,
Secretary of the Section.

CORNELL UNIVERSITY.

SECTION B.—PHYSICS.

Address of the Vice-President: Long Range Temperature and Pressure Variables in Physics. By Dr. Carl Barus, Brown University, Providence, R. I.

1. Screening Effects of Induced Currents in Solid Magnetic Bodies in an Alternating Field. By Mr. Charles P. Steinmetz, General Electric Company, Schenectady, N. Y.

2. The Design, Construction and Test of a 1250 Watts Transformer. By Professor Henry S. Carhart, Univ. of Mich., Ann Arbor, Mich.

3. Electrolytic Action in a Condenser. By Dr. K. E. Guthe, Instructor in Physics, Univ. of Mich., Ann Arbor, Mich.

4. On the Velocity of Light in a Magnetic Field. By Professor E. W. Morley, Cleveland, Ohio; Professor H. T. Eddy, Minneapolis, Minn., and Professor D. C. Miller, Cleveland, Ohio.

5. The Magnetic Survey of Maryland. By Dr. L. A. Bauer, Univ. of Cincinnati, Cincinnati, Ohio.

6. The Transmission of Radiant Heat by Gases at Varying Pressures. By Mr. Charles F. Brush, Cleveland, Ohio.

7. On the Rate at which Hot Glass absorbs Superheated Water. By Professor Carl Barus, Brown Univ., Providence, R. I.

8. A New Method of determining the Specific Heats of Liquids. By Robert L. Litch, A.M., Bethlehem, Pa.

9. On the Coefficient of Expansion of Certain Gases. By Professor Edward W. Morley, Cleveland, Ohio, and Professor Dayton C. Miller, Cleveland, Ohio.

10. The Effect of Heat on the Elastic Limit and Ultimate Strength of Copper Wire. By Professor Frank P. Whitman, Adelbert College, Cleveland, Ohio, and Mary C. Noyes, Ph.D., Lake Erie Seminary, Painesville, Ohio.

11. A Method of obtaining Capillary Canals of Specified Diameter. By Professor Carl Barus, Brown Univ., Providence, R. I.

12. Kites and their Use by the Weather

- Bureau in Explorations of the Upper Air. By Professor C. F. Marvin, U. S. Weather Bureau, Washington, D. C.
13. Experiments upon the Acetylene-Oxygen Standard of Light. By Dr. Clayton H. Sharp, Cornell Univ., Ithaca, N. Y.
14. Arc Spectra. By Professor Arthur L. Foley, Univ. of Indiana, Bloomington, Indiana.
15. On the Brightness of Pigmented Surfaces under Various Sources of Illumination. By Professor Frank P. Whitman, Adelbert College, Cleveland, Ohio.
16. Note on the Construction of a Sensitive Radiometer. By Professor Ernest Fox Nichols, Colgate Univ., Hamilton, N. Y.
17. Photographs of Manometric Flames. By Dr. Edward L. Nichols, Cornell Univ., Ithaca, N. Y., and Professor Ernest Merritt, Ithaca, N. Y.
18. The Discharge of Electrified Bodies by X-rays. By Dr. C. D. Child, Cornell Univ., Ithaca, N. Y.
19. A Final Determination of the Relative Lengths of the Imperial Yard of Great Britain and the Meter of the Archives. By Professor William A. Rogers, Colby Univ., Waterville, Me.
20. The Electric Conductivity of certain Specimens of sheet Glass, with reference to their Fitness for Use in Static Generators. By Professor Dayton C. Miller, Case School of Applied Science, Cleveland Ohio.
21. Graphical Treatment of Alternating Currents in Branch Circuits in case of Variable Frequency. By Professor H. T. Eddy, Minneapolis, Minn.
22. On Simple Non-Alternating Currents. By Professor Alexander Macfarlane, Lehigh University, South Bethlehem, Pa.
23. Exhibition of Instruments for determining the Frequency of an Alternating Current. By Professor George S. Moler, Ithaca, N. Y., and Dr. Frederick Bedell, Cornell University, Ithaca, N. Y.
24. The predetermination of Transformer Regulation. By Dr. F. Bedell, Cornell University, Ithaca, N. Y.; Professor R. E. Chandler, Salem, Va., and Mr. R. H. Sherwood, Jr., Brooklyn, N. Y.
25. The effect of Pressure on the Wave-lengths of the lines of the Emission Spectra of the Elements. By Dr. W. J. Humphreys, Johns Hopkins University, Baltimore, Md.
26. A New Form of Coal Calorimeter. By Charles L. Norton, Massachusetts Institute of Technology, Boston, Mass.
27. Notes on the Recent History of Musical Pitch in the United States. By Professor Chas. R. Cross, Massachusetts Institute of Technology, Boston, Mass.
28. A New Form of Harmonic Analyzer. By Dr. Frank A. Laws, Massachusetts Institute of Technology, Boston, Mass.
29. A Comparison of Rowland's Thermometers with the Paris Hydrogen Scale, and the Corresponding Correction to his Value of the Mechanical Equivalent of Heat. By Dr. W. S. Day, Johns Hopkins University, Baltimore, Md.
30. The Determination of the Surface Tension of Water, and of Certain Aqueous Solutions, by means of the Method of Ripples. By Dr. N. Ernest Dorsey, Johns Hopkins University, Baltimore, Md.
31. The Series of International Cloud Observations made by the U. S. Weather Bureau, and their relation to Meteorological Problems. By Professor Frank H. Bigelow, U. S. Weather Bureau, Washington, D. C.
32. The Effects of Tension and Quality of the Metal upon the Changes in Length produced in Iron Wires by Magnetization. By Byron Briggs Brackett, Johns Hopkins University, Baltimore, Md.
33. Measurement of Small Gaseous Pressures. By Charles Brush.

FREDERICK BEDELL,
Secretary of the Section.

CORNELL UNIVERSITY.

SECTION C.—CHEMISTRY.

Address of the Vice-President: Expert Testimony. By Professor W. P. Mason, Rensselaer Polytechnic Inst., Troy, N. Y.

The meetings of the Section will be held in conjunction with those of the *American Chemical Society*.

The papers of the Section will be divided into sub-heads with following committee in charge: A. B. Prescott, Organic Chemistry; W. A.

Noyes, Inorganic Chemistry; L. M. Dennis, Analytical Chemistry; H. W. Wiley, Agricultural Chemistry; Wm. McMurtrie, Industrial Chemistry.

The departments of Physical Chemistry and of Physiological Chemistry are not, as yet, filled.

Papers Presented to Secretary, A. A. A. S.

1. Recent Progress in Agricultural Chemistry. By Professor H. W. Wiley, Department of Agriculture, Washington, D. C.

2. Calculations of Calorimetric Equivalents of Agricultural Products from Chemical Analyses. By Professor H. W. Wiley and W. D. Bigelow, Department of Agriculture, Washington, D. C.

3. A Study of the Methods of Starch Determination in Agricultural Products. By Professor H. W. Wiley and W. H. Krug, Department of Agriculture, Washington, D. C.

4. The Action of Oxide of Manganese on Potassium Permanganate. By Chas. L. Reese, Baltimore, Md.

5. The Chemistry of Methylene. By Professor J. U. Nef, University of Chicago, Ill.

6. The Poisons of the Tuberculosis Bacillus. By Dr. E. A. de Schweinitz, Department of Agriculture, Washington, D. C.

7. The Action of Nitric Acid upon Aluminium and the Formation of Aluminium Nitrate. By Professor J. B. Stillman, Stevens Institute of Technology, Hoboken, N. J.

8. On the Action of Nitric Acid on Metals. By G. O. Higley.

9. Street Washings. By Professor L. P. Kinnicutt, Polytechnic Institute, Worcester, Mass.

10. Plastering and Mortar. By Professor L. P. Kinnicutt, Worcester, Mass.

11. Qualitative Analysis; a point in teaching that was not a full success. By Professor A. L. Green, Purdue University, Lafayette, Ind.

12. Annual Report on Indexing Chemical Literature. By Dr. H. C. Bolton, Washington, D. C.

13. On the Action of Sodium on Methylpropylketone and on Acetophenone. By Professor Paul C. Freer, University of Michigan, Ann Arbor, Mich.

14. On the Constitution of some Hydrazones. By P. C. Freer, Ann Arbor, Mich.

15. Position in the Periodic Law of the Important Elements found in Plant and Animal bodies. By Professor Harry Snyder, University of Minnesota, Minneapolis, Minn.

16. On two polymeric series of Phosphorus-Nitrogen compounds and on the Stereochemistry of Phosphorus and Nitrogen. By Dr. H. N. Stokes, United States Geological Survey, Washington, D. C.

17. The Chemical Composition of Cement Plaster. By Prof. E. H. S. Bailey, University of Kansas, Lawrence, Kan.

18. Recent Progress in Analytical Chemistry. By Professor L. M. Dennis, Cornell University, Ithaca, N. Y.

19. Alkyl Bismuth Iodides. By Professor A. B. Prescott, University of Michigan, Ann Arbor, Mich.

20. Kola tannin. By Professor A. B. Prescott, Ann Arbor, Mich.

21. A new form of Discharger for Spark Spectra of Solutions. By Professor L. M. Dennis, Cornell University, Ithaca, N. Y.

22. Recent Progress in Industrial Chemistry. By Professor Wm. McMurtrie, New York City.

23. On Solutions of Silicates of the Alkalies. By Dr. Louis Kahlenberg and A. T. Lincoln, University of Wisconsin, Madison, Wis.

Papers Presented to the Secretary of the American Chemical Society.

1. The Law of Solution. By Willis R. Whitney.

2. A New Thermostat. By Willis R. Whitney.

3. A Lecture Experiment illustrating the Law of Reactions of the First Order. By Willis R. Whitney.

4. Contributions to the Chemistry of Didymium. By L. M. Dennis and E. M. Chamot.

5. A Comparison of Methods for Determining Carbon Dioxide and Carbon Monoxide. By L. M. Dennis and C. G. Edgar.

6. Some New Compounds of Hydronitric Acid. By L. M. Dennis and C. H. Benedict.

7. A Preliminary Thermo-Chemical Study of Iron and Steel. By E. D. Campbell and Firman Thompson.

8. Further Study on the Influence of Heat-Treatment and Carbon upon the Solubility of Phosphorus in Steel. By E. D. Campbell and S. C. Babcock.

9. The Action of Certain Bodies on the Digestive Ferments. By Frank D. Simons.

10. The Decomposition of Heptane and Octane at High Temperatures. By A. W. Burwell.

11. Calculation of Calorimetric Values from Analytical Data. By H. W. Wiley.

12. The Chemical Composition of Cement Plaster. By E. H. S. Bailey.

13. Bacterial Products of Hog Cholera and Swine Plague. By E. A. de Schweinitz.

14. Detection of Foreign Fats in Butter and Lard. By C. B. Cochran.

15. Distillation in General. By Leon Labonde.

16. Apparatus for Photometric Determination of Lime and Sulphuric Acid. By J. I. D. Hinds.

17. The Composition of Humus. By Harry Snyder.

18. An Electrical Laboratory Stove. By M. D. Sohon.

P. C. FREER,

Secretary of the Section.

UNIVERSITY OF MICHIGAN.

SECTION D.—MECHANICAL SCIENCE AND ENGINEERING.

Address of the Vice-President: The Ground-work of Dynamics. By Professor John Galbraith, School of Practical Science, Toronto.

1. Development of Engineering Industries by Scientific Research. By Professor W. S. Aldrich, W. Va. University, Morgantown, W. Va.

2. The Cement Laboratory as a Field for Investigation. By Professor F. P. Spalding, Cornell University, Ithaca, N. Y.

3. The Effect of Spark Losses on the Efficiency of Locomotives. By Professor W. F. M. Goss, Purdue University, Lafayette, Ind.

4. A New Apparatus for Testing Indicator Springs. By Professor M. E. Cooley, University of Michigan, Ann Arbor, Mich.

5. Flue Gas Analysis in Boiler Tests. By Professor D. S. Jacobus, Stevens Institute, Hoboken, N. J.

6. Effect of Temperature on the Strength of Steel. By Professor R. C. Carpenter, Cornell University, Ithaca, N. Y.

7. The Properties of Aluminum Alloys. By Professor R. C. Carpenter, Ithaca, N. Y.

8. Analysis of Composite, Concrete and Iron Beams. By Professor J. B. Johnson, Washington University, St. Louis, Mo.

9. Definition of Elastic Limit for Practical Purposes. By Professor J. B. Johnson, St. Louis, Mo.

10. Theories of some Planimeters without the aid of Calculus. By Professor Forest R. Jones, University of Wisconsin, Madison, Wis.

11. The Production of X-Rays by Means of the Planté Accumulator, in which voltage is chiefly concerned, the effect of current being largely eliminated (Illustrated by Stereopticon.) By Professor W. A. Rogers, Colby University, Waterville, Me.

12. A Universal Alternator for Laboratory Purposes. By Professor Henry S. Carhart, University of Michigan, Ann Arbor, Mich.

13. Calculation of the Energy Loss in Armature Cores. By Professor W. E. Goldsborough, Purdue University, Lafayette, Ind.

14. A New Formula for Determining the Width of Leather Belting. By Professor John J. Flather, Purdue University, Lafayette, Ind.

15. A Graphical Solution of Belting Problems. By Professor John J. Flather, Lafayette, Ind.

16. On Engineering Conditions connected with the Mounting of Instruments used on Eclipse Expeditions. By Professor David P. Todd, Amherst College, Amherst, Mass.

JOHN J. FLATHER

Secretary of the Section.

PURDUE UNIVERSITY.

SECTION E.—GEOLOGY AND GEOGRAPHY.

Address of the Vice President: The Pittsburg Coal Bed. By Professor I. C. White, University of West Virginia, Morgantown, West Va.

1. Stylolites. By Professor T. C. Hopkins, State College, Centre Co., Pa.

2. A Suggestion in Regard to the Theory of Volcanoes. By Professor William North Rice, Wesleyan Univ., Middletown, Ct.

3. The Ores and Minerals of Cripple Creek, Colorado. By H. P. Parmelee, Charlevoix, Mich.

4. Observations on the Genus *Barrettia*. By Professor R. P. Whitfield, American Museum of Natural History, New York, N. Y.

5. Changes of Level in Mexico. By Dr. J. W. Spencer, Washington, D. C.

6. An Account of the Researches relating to the Great Lakes. By Dr. J. W. Spencer, Washington, D. C.

7. Lake Chicago and the Chicago Outlet. By Frank Leverett, U. S. Geological Survey, Denmark, Iowa.

8. The Lower Abandoned Beaches of South-eastern Michigan. By Frank B. Taylor, Fort Wayne, Ind.

9. Recent Earth Movement in the Great Lake Region. By G. K. Gilbert, U. S. Geological Survey, Washington, D. C.

10. Pre-glacial Topography and Drainage of Central-Western New York. By Professor H. L. Fairchild, University of Rochester, Rochester, N. Y.

11. Progress of Hydrographic Investigations by the U. S. Geological Survey. By F. H. Newell, U. S. Geological Survey, Washington, D. C.

12. The Geological Age and Fauna of the Huerfano Basin in Southern Colorado. By Professor Henry F. Osborn, Columbia University.

13. A Supplementary Hypothesis respecting the Origin of the American Loess. By Professor T. C. Chamberlin, University of Chicago.

Other papers will be read before the Geological Society of America.

C. H. SMYTH, JR.,
Secretary of the Section.

HAMILTON COLLEGE.

SECTION F.—ZOOLOGY.

Address of the Vice-President: The Spread of Species by the Agency of Man, with especial reference to Insects. By Professor L. O. Howard, Department of Agriculture, Washington, D. C.

1. On the Relationships of the Nematognaths. By Professor Theo. Gill, Columbian University, Washington, D. C.

2. Remarks on the Distribution of Scale-insect Parasites. By Dr. Leland O. Howard, Department of Agriculture, Washington, D. C.

3. On a collection of Cephalopoda from the 'Albatross' Expedition. By Professor William E. Hoyle, Owens College, Manchester, England.

4. On the Characters of the Brains of Nematognaths and Plectospondyls. By Dr. Benjamin T. Kingsbury, Ithaca, N. Y.

5. The Insect Fauna of *Cereus giganteus*. By Henry Guernsey Hubbard, Washington, D. C.

6. On the Sarcostyles of the Plumularidæ. By Professor C. C. Nutting, State University of Iowa.

7. Skeletons and Restorations of Tertiary Mammalia. By Professor Henry F. Osborn, Columbia University, New York.

C. C. NUTTING,
Secretary of the Section.

UNIVERSITY OF IOWA.

SECTION G.—BOTANY.

Address of the Vice-President: Experimental Morphology. By Professor George F. Atkinson, Cornell University, Ithaca, N. Y.

1. *Trillium grandiflorum* (Michx.) Salisb.; its Variations, normal and teratological. By Professor Chas. A. Davis, Alma College, Alma, Mich.

2. Contributions on Wild and Cultivated Roses of Wisconsin and Bordering States. By J. H. Schuette, Green Bay, Wis.

3. A Discussion of the Structural Characters the Order *Pezizineæ* of Schroeter. By Dr. E. J. Durand, Cornell University, Ithaca, N. Y.

4. The Taxonomic Value of Fruit Characters in the Genus *Galium*. By K. M. Wiegand, Cornell University, Ithaca, N. Y.

5. Changes during winter in the Perithecia and Ascospores of certain *Erysiphææ*. By B. T. Galloway, Department of Agriculture, Washington, D. C.

6. The *Erysiphææ* of North America: A preliminary account of the distribution of the species. By B. T. Galloway, Department of Agriculture, Washington, D. C.

7. Some Contributions to the Life-History of *Hæmatococcus*. By Professor L. R. Jones, University of Vermont, Burlington, Vermont.

8. 'Bacteriosis' of Carnations. By Albert F. Woods, Department of Agriculture, Washington, D. C.

9. Wakker's Hyacinth *Bacterium*. By Dr. Erwin F. Smith, Department of Agriculture, Washington, D. C.

10. Notes on some new genera of Fungi. By Professor George F. Atkinson, Cornell University, Ithaca, N. Y.

11. Reproductive Organs and Embryology of *Drosera*. By C. A. Peters, Normal School, Edinboro, Penn.

12. Development of some seed coats. By Dr. J. O. Schlotterbeck, University of Michigan, Ann Arbor, Mich.

13. Morphology of the Flower of *Asclepias cornuti*. By Fanny E. Langdon. Reported by Professor V. M. Spalding, University of Michigan, Ann Arbor, Mich.

14. Comparison of the Pollen of *Pinus*, *Taxus* and *Peltandra*. By Professor George F. Atkinson, Cornell University, Ithaca, N. Y.

15. Report upon the Progress of the Botanical Survey of Nebraska. By Professor Charles E. Bessey, University of Nebraska, Lincoln, Neb.

16. Are the Trees receding from the Nebraska Plains? By Professor Charles E. Bessey, University of Nebraska, Lincoln, Neb.

17. Some Characteristics of the Foothill Vegetation of western Nebraska. By Professor Charles E. Bessey, University of Nebraska, Lincoln, Neb.

18. On the Distribution of Starch in Woody Stems. By Professor Bohumil Shimek, University of Iowa, Iowa City, Iowa.

19. Mechanism of Root Curvature. By Dr. J. B. Pollock. Reported by Professor V. M. Spalding, University of Michigan, Ann Arbor, Mich.

20. The Toxic Action of Phenols on Plants. By Professor R. H. True and C. G. Hunkel, University of Wisconsin, Madison, Wis.

21. Cellulose-Ferment. By Professor F. C. Newcombe, University of Michigan, Ann Arbor, Mich.

22. Is the characteristic Acridity of certain species of the Arum Family a mechanical or a physiological property or effect? Chas. Porter Hart, M.D., Wyoming, Ohio.

23. How Plants flee from their Enemies. By Professor W. J. Beal, Michigan Agricultural College, Agricultural College P. O., Mich.

24. Movements of *Phyllanthus*. By Professor D. T. McDougal, University of Minnesota, Minneapolis, Minn.

25. Stomata on the Bud-scales of *Abies pectinata*. By Dr. Alex. P. Anderson, Exp. Station, Clemson College P. O., S. Carolina.

26. Comparative Anatomy of the Normal and Diseased Organs of *Abies balsamea* (L.) Miller, affected with *Aecidium elatinum* (Alb. et Schwein.). By Dr. Alex. P. Anderson, Exp. Station, Clemson College P. O., S. Carolina.

F. C. NEWCOMBE,
Secretary of the Section.

UNIVERSITY OF MICHIGAN.

SECTION H.—ANTHROPOLOGY.

Address of the Vice-President: The Science of Humanity. By Professor W. J. McGee, Bureau of American Ethnology, Washington, D. C.

1. The Rite of Adoption as practiced by the Osage Tribe. By Alice C. Fletcher, Peabody Museum, Cambridge, Mass.

2. The Superstitious Beliefs and Practices of the Ancient Mexicans. By Zelia Nuttall, Peabody Museum, Cambridge, Mass.

3. Koreshanity: a Latter-day Cult. By Dr. Anita Newcomb McGee, Washington, D. C.

4. Micmac Mortuary Customs. By Dr. Stansbury Hagar, Brooklyn, N. Y.

5. Report of the Committee on the Ethnography of the White Race in America. By Dr. Daniel G. Brinton, Chairman, Media, Pa.

6. Recent Researches by George Byron Gordon, on Ulloa River, Honduras. By Professor F. W. Putnam, Peabody Museum, Cambridge, Mass.

7. Surveys of Ancient Cities in Mexico. By Professor W. H. Holmes, Field Columbian Museum, Chicago.

8. An Ancient Figure of Terra-Cotta from the Valley of Mexico. By M. H. Saville, Amer. Mus. Nat. History, New York.

9. The Serpent Symbol in Nicaragua and Yucatan. By Rev. Stephen D. Peet, Good Hope, Illinois.

10. A Case of Trephining in Northeastern

Mexico. By Dr. Carl Lumholz, Amer. Mus. Nat. History, New York.

11. Notched Human Bones from a Prehistoric Tarascan Tomb in Michoacan. By Dr. Carl Lumholz and Dr. A. Hrdlicka, New York.

12. A Cranium and Skeleton from an Ancient Burial Place in the Valley of Mexico. By Dr. A. Hrdlicka, New York.

13. An Archaeologic Map of Ohio. By Warren K. Moorehead, Ohio State University, Columbus, Ohio.

14. Early Man of the Delaware Valley. By Professor F. W. Putnam, Peabody Museum, Cambridge, Mass.

15. Archaeologic Researches in the Trenton Gravels. By Professor W. H. Holmes, Field Columbian Museum, Chicago.

16. Geologic Age of the Relic-bearing Deposits at Trenton. By Professor R. D. Salisbury, Chicago University, Chicago.

17. Prehistoric Implements from Charlevoix, Michigan. By H. P. Parmelee, Charlevoix, Mich.

18. Decoration of the Teeth in Ancient America. By M. H. Saville, American Museum Natural History, New York.

19. The Origin of Art as manifested in the Work of Prehistoric Man. By Dr. Thomas Wilson.

20. The Import of the Totem—A Study of the Omaha Tribe. By Alice C. Fletcher, Washington, D. C.

21. The Jessup Expedition and the Asiatic-American Problem. By Professor F. W. Putnam, American Museum Nat. Hist., New York.

22. Evidence of contact with Polynesia and the Asiatic Coast. By Rev. Stephen D. Peet, Good Hope, Ill.

23. The Ethnologic Arrangement of Archaeologic Material. By Harlan I. Smith, American Museum Nat. Hist., New York.

24. The Tagbanna of the Philippines. By Dean C. Worcester, Ann Arbor, Mich.

25. The Mangyane of the Philippines. By Dean C. Worcester, Ann Arbor, Mich.

26. The Artificialization of Animals and Plants. By Professor O. T. Mason, National Museum, Washington, D. C.

27. Report of Committee on Anthropologic Teaching.

28. A Statistical Study of Eminent Men. By Professor J. McKeen Cattell, Columbia University, New York.

29. Mental Conditions determining the Rate of Movement. By Professor Lightner Witmer, University of Pennsylvania, Philadelphia.

30. Genesis of Implement-making. By Frank Hamilton Cushing, Bureau of American Ethnology, Washington, D. C.

SECTION I.—SOCIAL AND ECONOMIC SCIENCE.

Address of the Vice-President: Improvident Civilization. By Mr. R. T. Colburn, Elizabeth, N. J.

Beginning on Tuesday, August 10th, the following papers will be read;

1. The Civil Service Reform. By Dr. Wm. H. Hale, Brooklyn, N. Y.

2. Civic Ownership of Public Works. By Dr. Wm. H. Hale, Brooklyn, N. Y.

3. Racial Deterioration: the Increase of Suicide. By Lawrence Irwell, Buffalo, N. Y.

4. Wheat Consumption in the United States. By Henry Farquhar, Dep't of Agriculture, Washington, D. C.

5. The Municipal System of Ontario. By C. C. James, M.A., Toronto.

6. The New Canadian Tariff. By Professor James Mavor, Toronto.

7. Suggestions for an International Conference on Diversity of Languages. By R. T. Colburn, Elizabeth, N. J.

8. The 'Social Mind,' or 'Social Conscience;' its origin and persistence. By _____.

9. Tariffs and Trade. By Archibald Blue, Bureau of Mines, Toronto.

10. The Course of Ontario Agriculture during the past ten years. By C. C. James, M.A., Toronto.

11. The U. S. idea in laying out the Public Lands and the Evils resulting therefrom. By B. W. DeCourcy, Tacoma, Wash.

12. Labor Restrictions as Potent Factors in Social Evolution. By Dr. Charles Porter Hart, Wyoming, Ohio.

13. International currency. By H. P. V. Bogue, Avon, N. Y.

ARCHIBALD BLUE,
Secretary of the Section.

BUREAU OF MINES, TORONTO.

